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Organization of the Infantry Battalion
New Armament and Tactics
From Authoritative Sources

THE organization, armament and tactics herein described are being used in the French Army, and show the great modifications which have been effected up to date.

The weapons included in the new infantry armament are:

The Chauchat automatic machine rifle, which weighs 18 pounds and can be fired from the hip while marching, or used in position like a machine gun.

The Vivèn-Bessières rifle grenade, which is thrown from the muzzle of an ordinary rifle by the use of a tromblon or blunderbuss carried by the soldier and easily atached to the muzzle. The projecting force is the ordinary ball cartridge. It is said to be most effective, safe and sure. Men acquire excellent accuracy after practice, firing from the hip or with butt resting on ground.

Hand grenades (both offensive and defensive types).

The 37 mm. cannon, which is transported on a light pair of wheels, but is usually dismounted for firing. This is a rapid-fire, long recoil gun with a split trail mount. The mount is easily taken off the axle and placed on the ground.

Besides the armament above described, the infantry in the trenches also handle the trench weapons of low power, the pneumatic Boileau-Debladis and the Brandt having given the greatest satisfaction.

THE ARMAMENT OF THE INFANTRY

The armament of the Infantry has been the subject of profound modifications since the beginning of the campaign. This evolution is characterized by the continual greater importance taken by automatic weapons (machine guns proper and automatic machine rifles) and by the greatly extended use of explosives in the form of grenades.

In a general way, the matériel is increased in proportion as the effective strength is decreased. The infantry has a marked tendency to search for arms which give the maximum efficiency at short ranges.

The following table will give an idea of the evolution which has been accomplished:

	At commencement of campaign	At present
Rifle with bayonet	Almost the whole strength.	
Hand grenades	None	32 grenadiers per company.
Rifle grenades	None	16 Vivèn-Bessières per company.
Automatic machine rifles	None	8 per company.
Machine guns	2 for four companies	8 for three companies.
37 mm. cannon	None	1 per battalion.

In the battalion, one company of the four is specialized in the service of machine guns. In the company, half of the combatant effectives is specialized in the service of other arms than the rifle; in fact, out of the 160 soldiers who, normally, fight in their section, there are 32 hand grenadiers; 24 rifle grenadiers with Vivèn-Bessières (including 1 ammunition carrier for each 2 V.-B.'s) and 24 fusiliers,[1] a total of 80 specialists.

The new arms therefore absorb more than half of the effective combatant strength of the infantry; each soldier must be instructed in a specialty; the infantryman, who in ranks is armed with a rifle (*voltigeur*), awaits, in a manner, until the disappearance of a comrade gives him the chance to employ himself in his specialty.

CHARACTERISTICS OF THE NEW ARMS

Hand Grenades

The grenade is a weapon of close combat, and is employed in the defense as well as in the attack.

Defense.—All soldiers, *except the awkward ones,* should be able to execute a barrage at 25 meters; this barrage of *a defensive character,* made with one man every 10 meters with a grenade OF (offensive), or by one man every 15 meters with a grenade FL (defensive), cannot be crossed.

Several well-trained grenadiers, courageous and well provided with grenades, are able to offer a resistance difficult to overcome, and can thus cover the essential organizations of the defense, machine guns, command, posts, exits, communication trenches, etc.

Attack.—The hand grenade is the weapon used to attack an adversary at short range who is entrenched, but all men are not apt for the grenade attack; experience proves that the range, the accuracy of the grenadiers, and the discipline of the attacking troops are factors of superiority more important than numbers.

The grenadiers are chosen soldiers, who, formed in small groups, receive an individual and collective training which renders them particularly apt for *offensive* combat (attacks or counter-attacks). In attack their mission is essentially to break the localized resistance of the enemy; they form in the same manner the principal element of the groups of trench-cleaners and of the detachments designated to execute surprises.

Rifle-grenades Vivèn-Bessières

The grenade V.B., habitually employed as a trench weapon, is above all a combat arm.

Sixteen tromblons throw 150 grenades a minute and produce *automatically* an impassable barrage varying in depth from 80 to 150 meters along a company front of 300 or 400 meters.

The grenade V.B. is deadly; it permits of reaching and destroying the enemy hidden in trenches or in shell holes.

The grenade V.B. is particularly valuable in the offensive, (*a*) to enable the attacking infantry to prepare its attack upon certain points should the enemy be found unprepared; (*b*) to oblige the enemy to remain under cover at the moment the assault is launched; and finally (*c*) to make a barrage in front of the counter-attacks of the enemy.

[1] The name given to soldiers belonging to the automatic machine rifle personnel.

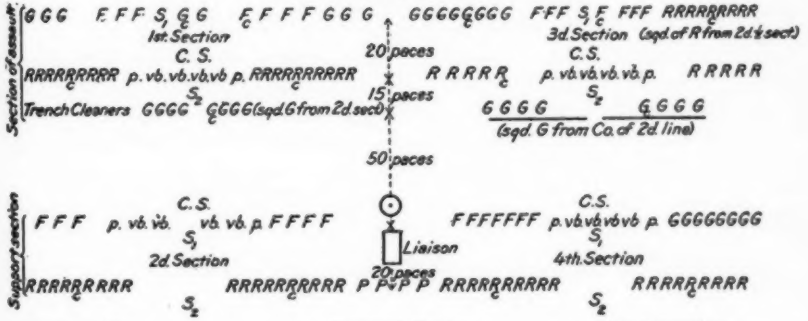
Replenishment of grenades. — In close combat the consumption of grenades is enormous, and as they are heavy, this replenishment must be an object of particular attention for the commanding officer.

A battalion of three companies must not start to attack without a minimum of 2,000 hand grenades, 1,500 grenades V.B. (sufficient for 2 minutes of fire). As soon as the objective is reached, the supply must be replenished and the proportion of rifle grenades increased.

ing the last few rushes of the attack. The arm possesses neither the rigidity nor the rapidity of the machine gun, which it cannot completely replace. Its fire is nevertheless similar to that of the machine gun and produces an undeniable moral effect; furthermore, it is at the disposition of small units at moments and under conditions when the setting up of machine guns would not be possible.

Doubts have been expressed as to the strength of the mechanism of the

Sketch No. 1.—Company of the First Line in Attack Formation (Front 200 M.), Having Two Sections of Assault.



G Grenadier.
G_c Corporal Grenadier.
F Fusilier.
(automatic machine rifleman).
F_c Corporal Fusilier.
R Rifleman.
R_c Corporal Rifleman.
vb Rifle Grenadier.
p Ammunition Carrier.
P Pioneer.
S_1 Sergeant of half-section.
S_2 Sergeant of half-section.
C.S Chief of Section.
Company Commander.

Automatic machine rifle.—This arm has just been tested in service and has been greatly appreciated by our troops. Its characteristics are: Extreme mobility when its personnel consists of three men; assured efficacy at short ranges; the fire is automatically low; a certain efficacy at medium ranges; a sweeping fire is easily executed; the possibility of firing while marching, a facility which in certain cases forces the adversary to keep under cover dur-

automatic machine rifle; experience has proven that this objection is not well founded if precaution be taken not to remove the arm from its case until the moment of its employment.

Machine guns.—The efficacy of the machine gun cannot be calculated. Any body of troops, whatever may be its strength, crossing at short range the line of fire of a machine gun efficiently served will be destroyed; it is for this reason that in most cases this arm is

employed to flank the approaches of a position. The increase of the number of machine guns has permitted either the increase of the front which a certain strength can hold, or its depth in the defense.

The 37-mm. cannon.—Among the characteristics of the 37-mm. cannon are a sufficient mobility to accompany the infantry in all circumstances of combat, an extreme precision, a great ease of adjustment and a useful range up to 1,500 meters.

The bursting shell produces effects comparable to that of a grenade, supplemented by a force sufficient to pierce, before bursting, either two or three thicknesses of sand-bags, a wooden protection, or a light steel plate.

This arm is used to destroy with direct fire the visible machine guns.

In a recent experimental test it required thirty minutes to destroy with a trench cannon a machine-gun shelter; the cannon had to be advanced to within 350 meters of the objective under conditions which would have been impossible in combat.

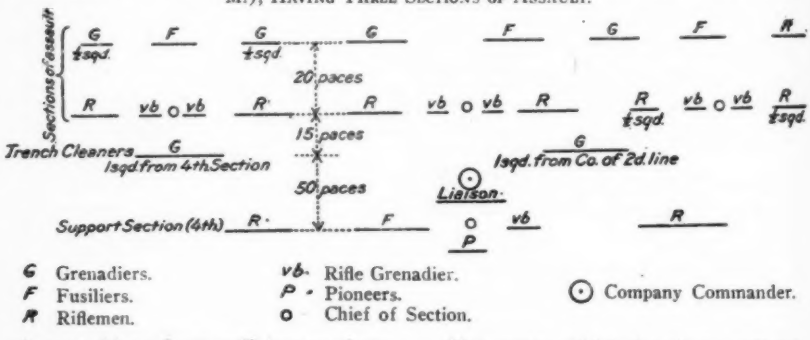
The same machine gun would have been put out of action in two minutes at the most by a shot in the embrasure fired from a 37-mm. cannon under good conditions at 700 or 800 meters from the objective.

The 37-mm. cannon is able to give equally appreciable results against troops by enfilade fire.

These pieces must be employed separately and not grouped in batteries, a lesson learnt from the first experience in action.

Offering good targets, these guns must wait until the last minutes which precede the assault to execute the destruction of the visible machine guns the artillery may not have silenced.

SKETCH NO. 2.—COMPANY OF THE FIRST LINE IN ATTACK FORMATION (FRONT OF 250 TO 300 M.), HAVING THREE SECTIONS OF ASSAULT.



The routes which the pieces will follow during the attack should be known to all commanders, so that they may be found if their aid is needed.

The characteristics of the new armament of infantry may be summed up as follows:

1. The increase in the number of machine guns has augmented the defensive capacity of the battalion; this unit cannot be dislodged from its ground as long as its machine guns are intact.

2. The 37-mm. cannon is the weapon of the assailant, since its essential rôle is the destruction of machine guns.

3. The employment of automatic machine rifles and the extended use of grenade barrages permit the company to hold more solidly its ground while awaiting the artillery barrages. They are particularly valuable for the infantrymen, after the capture of an objective, when owing to the lack of exact knowledge of the situation the artillery cannot cover its infantry.

4. The grenadier groups are essentially offensive elements; combined with fusiliers, they are able to form the leading groups capable of breaking up local resistances which escaped the artillery preparation; their employment will make possible what is called a progression foot by foot, the fusilier beating down the enemy who is uncovered while the grenadier attacks the entrenched adversary; the riflemen follow. It is in view of this double employment that the grenadiers and fusiliers must be placed in the first wave of attack, which may, in fact, in many cases be made up of them only.

5. The simultaneous employment of machine guns, of the 37-mm. cannon, of Vivèn-Bessières grenades, and of automatic machine rifles permits the infantry to force the enmey to remain crouched in their trenches while the grenadiers and fusiliers throw themselves upon them. When the intervention of the artillery is not possible, one can, by this means, prepare certain small operations, rectifications which follow great attacks, surprises, etc.

ORGANIZATION OF THE SPECIALISTS IN THE COMPANY AND BATTALION

Battalion

The organization proposed for the battalion is that fixed by the tables of war effectives, with the modification that, save under exceptional cases, the 37-mm. cannon is always attached to the machine-gun company for the attack.

Company

The companies of riflemen are formed in four sections. Every section is uniformally composed of:

a. One half-section of specialists (about 40 combatant men in the section).

b. One half-section of riflemen.

The half-section of specialists is formed of a chief of half-section, specialized grenadier or fusilier; two squads.

The first squad consists of a corporal and seven grenadiers obtained by uniting the regular grenadiers and substitutes; four of these grenadiers are armed with a rifle and all are provided with hand grenades.

The second squad is composed of one corporal and six fusiliers; that is to say, the personnel of two automatic machine rifles.

The half-section of riflemen consists also of two squads and includes four soldiers armed with the tromblon Vivèn-Bessières and two ammunition bearers carrying rifle grenades.

This organization gives the advantage of permitting the introduction of new arms into the infantry without upsetting the present organization; the captain commands all the sections. Furthermore, all the specialists are officered; and if they do not receive any particular instructions, they play a normal rôle in the combat; on the other hand, the chief of battalion and the company commander, always knowing where to find these weapons, can, if necessary, con-

centrate them in view of a particular action.

All in all, the organization and equipment of the single section has been greatly modified; its combat formations must therefore take into consideration this new organization.

COMBAT FORMATION

Offensive

During the past year the infantry went forward from the trenches of departure in dense lines, because the first waves were often the only ones to escape the German barrage fire; it was therefore necessary to throw upon the enemy in the minimum time the maximum of troops.

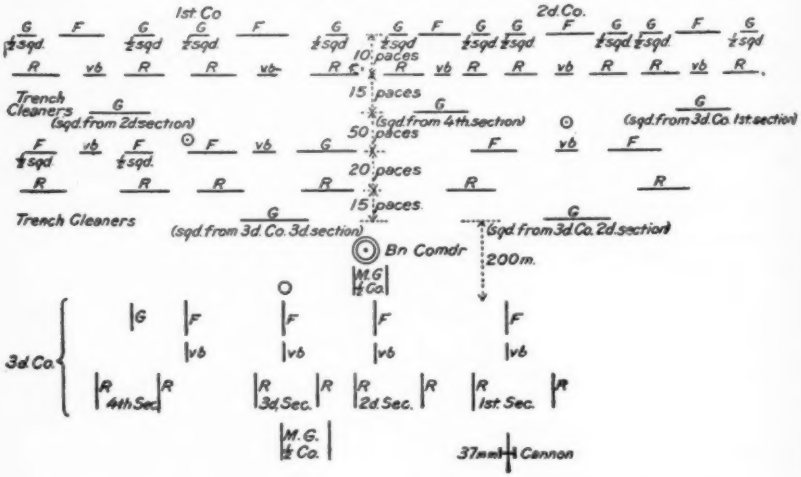
This year the more and more extended use of the counter battery in action has permitted sending out men in thinner lines, much less vulnerable; we have thus to admit the almost general rule of forming the first waves of men placed at four or five paces interval.

Section.—A chief of section can command only a front of 80 to 100 meters; therefore an interval of four or five paces between the men will allow the section to form in two lines. A company of the first line will therefore generally start the assaulting sections and those in support by forming each in two waves.

The first wave of the assaulting section will in most cases consist (over open ground cut up by shell holes) of the squad of grenadiers and fusiliers; the second wave will be formed by the half-section of riflemen reinforced by the grenadiers V.B. The section is thus capable of becoming completely engaged in case it should come in contact immediately with the enemy (the rifle grenadiers V.B. are placed at sufficient working distance); furthermore, the fusiliers are in a position to instantly reach any enemy in movement on the open ground.

Naturally, if the terrain is cut up

SKETCH NO. 3.—BATTALION IN ATTACK FORMATION (FRONT OF 400 TO 500 M.).



Naturally, if the terrain is cut up

(woods, villages), the proportion of grenadiers might be augmented by taking them from the sections of the support, and the fusiliers would be sent back to the second wave; on the other hand, if the distance to cross between the departure trench and the enemy exceeds 300 or 400 meters, the number of fusiliers would be augmented.

The supporting sections also march in two waves, the first wave generally formed of the half-section of specialists; because, should the necessity of reinforcing the assaulting section arise, the specialists will be called upon first.

The position of the chiefs of section is between the two waves in the assaulting section and with the first wave of the support section.

In a terrain cut up by shell holes, the echeloning of the section, with specialists in front, is also the most favorable formation to progress by rushes. The half-section of specialists is sufficiently armed to clean out the shell holes or to resist a hostile counter-attack. Upon reaching its objective it is joined by the half-section of riflemen who immediately organize the captured ground.

Company.—In a recent battle, the normal front allotted to a company varied from 200 to 300 meters, depending on the extent of his front. In such case the captain will put into the first line two or three sections, which he should be able to reinforce with specialists. He will place one or two sections in support, in front of which he will march. According to circumstances the support will be engaged completely or by groups of specialists.

If the attack is made under the form of an assault, the fractions specially detailed to clean up the enemy trenches, which the company must cross before reaching its objective, march between the assaulting and the supporting sections.

If the attack has to take the form of a progression, the echeloning of the sections is made according to the same principles; but the fractions specially charged with the trench cleaning become unnecessary; the terrain is cleaned up during the progression by the same troops that take possession of it.

In general, due to the incorporation of the specialists in each section, a captain can utilize his four sections according to the principles in vogue before the introduction of the new armament of the infantry, guaranteeing positive results. Furthermore, owing to the fact that the specialists are officered, they can be taken out of their sections, thereby enabling a skillful company commander in particular cases to make combinations more appropriate to circumstances, consequently giving much greater results.

Battalion.—The battalion has received as first objective all the enemy trenches (a–b–c–d)[1], front of departure about 450 meters.

The battalion must then progress upon a second objective, which extends over the front (x–y)[1] and is prolonged 250 meters in the south of y.

It is supposed that the preparation made by the artillery on the first objective appears complete and that the chief of battalion hopes to take this objective at a single dash, although he may be obliged to force a resistance and consequently provides for a maneuver on the cluster of shelters that the photo-

[1] Refer to squares on a map.

graphs indicate in the region a'–b'–c'–d'.

The orders of the chief of battalion in consequence must prescribe—

a. The general arrangement in which the battalion must start, namely,

Two companies in the first line;

Support ½ company of machine guns,

1 company,

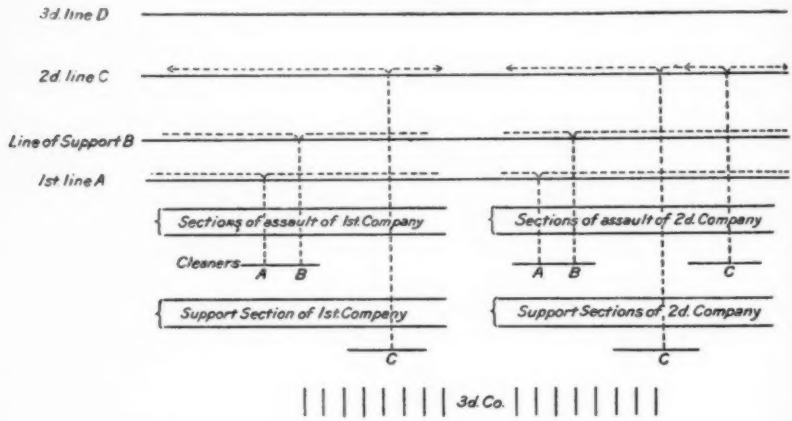
½ company of machine guns with the 37-mm. cannon.

b. The mission of the companies of the first line, that is to say:

sances composed of half-sections of specialists to advance toward the ulterior objective up to the limit of the French artillery barrages.

The front assigned to each company is in proportion to the resistance foreseen; the left company would, for example, have a front of 200 meters, which would permit the captain to keep out two sections in support; the right company would have a front of 250 meters, the captain holding the special-

Sketch No. 4.—Plan for Trench Cleaning for Battalion in Attack Formation, as Shown in Sketch No. 3.



The objectives—Right company.

Left company.

The zone of march—Left company: between the communication trenches (a''–x'') inclusive (b''–y'').

Right company: between the communication trenches (b''–y'') and the line (m–n).

The maneuver in case of resistance of the enemy in the region of a'–b'–c'–d'.

The disposition to take on the arrival at the objective, reconnaisists of his single section of support ready to act toward a'–b'–c'–d'.

c. The points to be attained successively by the different units which the chief of battalion has kept in his own hands (machine guns, supporting company); the routes which they must follow; the disposition of the supporting company (sections in line or echeloned).

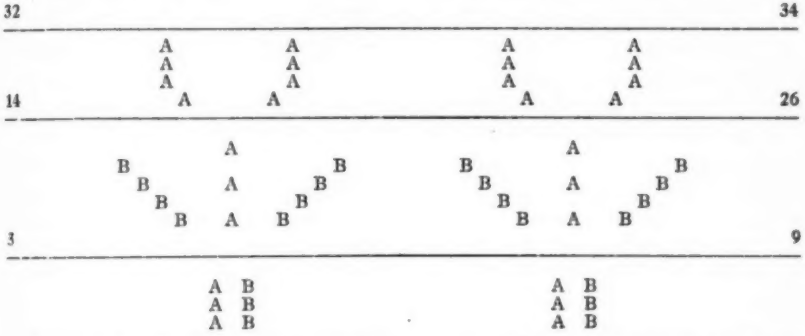
d. The mission assigned to the second echelon of machine guns and to the 37-mm. cannon, which, remaining in the vicinity of the trench of departure, must cover eventually with their

fire the forward movement of the battalion; the route in detail which the 37-mm. cannon will afterwards follow.

e. The dispositions made for trench cleaning.

This operation is as difficult as it is important, the number of participants being less important than their training; the squads of grenadiers are perfectly suitable for this task. It is useful to reinforce them by some detachment of riflemen which can act as escort for the prisoners.

The chief of battalion must make a complete plan for the trench cleaning; the deeper the objective the more precise the plan must be.



As stated, all the fractions designated to clean up the objective, which should be reached in a single dash by the leading sections, march immediately behind the sections.

In the case considered the objective would be divided into two zones in the direction of depth, the groups A would be charged with the cleaning up of the foremost to the front, the groups B with the cleaning up of the zones nearest the base of departure. In the two zones the cleaning up would be made simultaneously as shown in sketch.

The groups A and B start out together; but the groups B stop upon the line 3–9 and commence cleaning up the one 3–9–14–26; while the groups A march without stopping up to the line 14–26; arriving there, they commence cleaning up the zone 14–26–32–34.

f. The itinerary which the chief of battalion will follow.

g. The arrangements prescribed for the liaison with the aviators and with the artillery.

h. The arrangements prescribed for the replenishment of ammunition and for the evacuation; the communications which the pioneers and eventually the engineers will have to re-establish immediately in the captured ground and to connect with the trenches of departure, etc.

In spite of the complication of the details, the advance of the battalion will be simple if each one, before the action, knows the point from which he must start, where he is to go, the route to follow, and the task to be accomplished on the way or on arrival.

Each company commander, every section commander, and every commander of a fraction charged with trench cleaning should possess a sketch upon which must be shown the different tasks allotted; moreover, the chances of

success will be very much augmented if the troops have been able to carry out exercises upon a terrain representing the departure trenches and the trenches of the enemy.

To sum up, the rigid composition of the waves, their invariable succession, which were included in last year's principles, are less important than a precise orientation given to each man before the departure.

The assault having succeeded, the battalion progresses toward the second objective; this progression has been prepared by the reconnaissances sent out by the leading units after their arrival at the first objective. It requires a new cooperation with the artillery. It will be generally executed by the fractions or units of the support which will pass through the leading units which have been used up or disorganized.

We make a clear distinction between the assault and the progression. In the assault we endeavor to take at a single dash a complete hostile area; the consolidation only commences when the objective has been captured throughout its depth. It is absolutely necessary to foresee a methodical trench cleaning, because certain lines have been crossed over and remain unoccupied.

In the progression, on the other hand, every *point d'appui* reached is immediately cleaned up and organized by the unit which has taken it. The latter has not, therefore, available all of its effective strength to take up the forward movement, which will require the utilization of supports.

The infantry must be convinced that it actually possesses the power to break down certain resistances without calling for the help of the artillery. By the natural flow of reinforcements from the rear to the front, the commander is assured of having available the means to hurl upon the enemy a rain of grenades and bullets, which permits him to organize the assault and to carry it out.

Defensive[1]

The object of a body of infantry attacked is to oppose the enemy with his weapons of great power—machine guns, automatic machine rifles, rifle grenades and hand grenades—and to reserve for the counter-attack the groups best adapted for the close combat (grenadiers and riflemen).

In general, there is always one line upon which the resistance must be made with the greatest energy. For the defense of this line the following methods are recommended:

The most formidable arm which the infantry on the defensive has available is the machine gun delivering a flank fire. This fact must be considered by the chief of battalion in the division of the front among the companies of the first line. The front may be increased when flanking machine-gun fire is possible. Every machine gun which is disposed for flanking fire should be covered by grenadiers, or else the gunners will think only of their own defense and fire upon the enemy groups which advance upon them.

The automatic machine rifle can also be employed to obtain flanking fire, but in this respect it is inferior to the machine gun, because it is a lighter matériel, and the soldier who operates it will have a stronger temptation to think of his personal defense. Nevertheless, it

[1] This study only concerns the defense of positions such as they are organized in the armies which have been installed in position for a year (successive lines of continuous trenches).

must be stated as a rule that every machine gun put out of action must be immediately replaced by automatic machine rifles.

The automatic machine rifles not used for flanking fire, the rifle grenades V. B., and the hand grenades are used to produce barrages with a company front not exceeding 400 meters in open ground; the barrages of the automatic machine rifles and the V. B. grenades can be superposed. If the front is of more than 400 meters, it is better to juxtapose them.

Finally, it must be able to defend the entire front with a barrage of hand grenades. All the riflemen and grenadiers who remain unemployed are reserved to counter-attack the enemy.

The companies of the second line are disposed in a similar manner, *i. e.*, machine guns, automatic machine rifles, and rifle grenades V. B. are placed so as to cover with fire every portion of the first line which might be invaded by the enemy. After a short preparation by fire, grenadiers and riflemen counter-attack.

To provide the means of protection for the machine guns and automatic machine rifles used for flanking fire, to arrange for barrages, and to organize the groups for counter-attack are the duties of the captain; the execution falls upon his proper subordinates in the sections with as little interference as possible.

It has been proven that the defensive capacity of infantry troops and their offensive power have been considerably increased by the employment of the new armament. But the weapons of high power are only valuable if they are in the hands of courageous, disciplined and instructed soldiers, directed by commanders possessing precise knowledge of their proper employment.

In this war the methods of combat are being continually modified. It is the duty of every one to note these modifications and to apply them as soon as possible. Courage being equal, victory belongs to the most skillful.

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Property Accountability

By Lieut.-Colonel Mark L. Hersey, 24th Infantry

IN JANUARY of this year, General Pershing called a board of officers together at Colonia Dublan, Mexico, to recommend changes in the present system of property accountability in the Quartermaster's Corps, to the end of eliminating a large portion of the paper work now required and better safeguarding the interests of the Government. Each of the three members of the board had had special experience in matters of supply. If adopted, it is believed their recommendations would go a long way toward increasing the efficiency of the United States Army.

In the office of the chief quartermaster of the Punitive Expedition were found forty-five books and pamphlets that he claimed necessary for reference in the performance of the duties of his office. The majority of these are needed by every regimental supply officer.

Stories of National Guard supply officers becoming hopelessly involved, with a corresponding waste of property, are current along the border. One of the great items of loss is clothing issued and not charged against the men; even the trained supply officers of the regular service are far from having clear records as a result of the year in Mexico. If our own officers cannot thoroughly comprehend and intelligently execute the instructions of the Quartermaster General, much less can the regimental supply officers of the new organizations called into the service be expected to do so, though certainly above the average in intelligence. There is crying need for a drastic change.

We need to know what we want, how to get it, and how to take care of it.

The board made thirteen recommendations in brief as follows:

1. An Equipment Manual for each arm and separate organization. Most infantry officers, for example, realize the convenience of Captain Conley's Infantry Manual.

2. Having before us a manual telling us what we require, we want a second manual to tell us how to get it. Let this be called the Supply Manual, of which the most notable feature is a single blank form for requisition, invoice, receipt, and memorandum receipt.

3. Most important of all: make the regimental commander solely responsible for the equipment of his regiment. When he approves his R. S. O.'s requisition, that approved requisition becomes the receipt for the property at the depot; no one has authority to cut down this requisition which, when filled and invoiced, is then dropped and no further returns required, the regimental commander becoming responsible for the safeguarding of the property. His decision, in regard to disposition of any article, is final. When an article is worn out, the colonel destroys it and notes it in his R. S. O.'s property record. The rare cases of dishonest disposition of property on the part of officers—which is the only possible argument for the present system—would be incomparably less than the present great cost of auditing these multitudinous accounts which are about to be multiplied a thousandfold. Let an officer's signature amount to something in our army, as is so notable and final in the armies of Europe. To make the commanding officer directly responsi-

ble for the proper equipment of his regiment, and the expenditures connected with the same, would give him a source of personal responsibility which he does not feel under present methods. If he fails, drop him from command.

4. Make regimental supply officers accountable for all non-expendable articles of field equipment. Extend the present system of making the R. S. O. accountable for all articles of field equipment in the quartermaster corps to all supply departments; instead of having sixteen returns for ordnance from each regiment, have one.

5. Issue all articles of field equipment on the requisition of the supply officer of the organization, approved by the commanding officer.

6. Use the same blank form for requisition, invoice, receipt, and memorandum receipt. This pertains to the supply manual. When a supply officer puts in a requisition he puts it in in triplicate. The first copy is signed by the depot quartermaster and returned with the supplies as an invoice. Of the other two, the depot quartermaster keeps one and forwards one to the quartermaster general. Should the depot be unable to fill a requisition in full, the burden of showing why would fall on the depot quartermaster and, if necessary, a due bill for the shortage would go along with the invoices. It is reported by one of our officers lately on duty with the Austro-Hungarian Army that 60 per cent of their supply officers lost their positions on account of demonstrated inefficiency as the result of the first six months' operations.

7. Have property records kept with the supply company. Let the supply company make out pay rolls for the regiment, leaving in the hands of the fighting organizations only memorandum receipts for property and the individual equipment and account sheet of each man. Any change that might come up in a man's pay status, like a court-martial fine, could be forwarded at once to the supply officer.

8. Keep the clothing accounts on the payrolls and have monthly settlements. When a man enlists, place to his credit on the next payroll in column marked "Clothing Allowance" his initial clothing allowance. If he is an old soldier and needs no clothing, this clothing allowance becomes a bonus for reenlistment; each month thereafter, place to the soldier's credit one-twelfth of his annual allowance. If he does not draw it, he receives the amount in cash. If he overdraws, he pays it out of his monthly pay. Charge on the payrolls all clothing drawn. The payroll thus becomes both a property and money voucher, and we have a perfect audit for our clothing which we do not have now nor have we ever had. This system has been employed in the Philippines Constabulary more than ten years, with entire satisfaction and a great saving of money as well as paper work.

9. Pay commutation of rations on payrolls. In a recent case in the 24th Infantry, the writer examined the papers required to pay the ration money to a soldier who had been absent on a furlough. Ten typewritten pages and two blank forms were filled out in order to get this man his $9.50. This entered in a column on the payroll headed "due soldier, commutation of rations," and, in the column of remarks, half a line for the order giving him his furlough, would have served the purpose better than the ten pages mentioned above.

10. Require no returns from regimental supply officer. The manual, pro-

vided in paragraph 1, will give the articles he is required to be accountable for; add a small working excess. A property account, subject to inspection at all times by inspectors general or other officers authorized to make such inspections, will safeguard the interests of the Government far better, it is believed, than the present methods. To properly check up the innumerable returns against the more innumerable invoices and receipts pertaining to same takes an army of employes. It is believed that the only saving to the Government resulting from the use of the present cumbersome method is the extremely rare case where higher authority has reversed some action taken and ordered something charged that had been otherwise disposed of. The small saving made this way is a drop in the bucket compared with the salaries paid in the audit. One of the difficult features of the situation in the past has been the throwing out of employment a large number of faithful employes in the War Department. In the great enlargement now before us there is plenty of work for all of them without any discharges, and we can avoid the enormous increase that would be necessary in this force if the present cumbersome system is continued. Take for example the expenditures in the late Punitive Expedition. No vouchers were required from the supply officers of that expedition covering the disposition of expendable articles, which exceeded in the aggregate many times the value of the non-expendable articles used by the organizations. Then why should a return be required for non-expendable articles? It is a waste of time; it takes an army of clerks to make the checks; it is never practical in time of war; Congress has always had to come to the rescue and pass all accounts except those showing absolute dishonesty. Dishonest practices are rarely, if ever, discovered by this system of returns, but are usually found out in some other way.

11. Keep records of public animals on a sheet of paper, an animal to a line instead of requiring a descriptive list for each one.

12. Place to the credit of every regimental supply officer a small sum, perhaps $1,000, to be used for the purchase of supplies in the field in campaign and, when necessary, in time of peace. It amounts to issuing money on memorandum receipt. We issue property in this way and there seems to be no reason why money should not be treated in the same way. The advantage of having cash in the hands of the R. S. O. with which to meet small emergencies is too apparent to need discussion. When expended, a statement should be rendered to the nearest chief quartermaster and the amount replenished at once so that this purchase fund will always be intact.

13. Pay officers by checks. Require no pay accounts. There seems to be no advantage in the present system of pay accounts. They are not required from retired officers. They were long ago abolished in the Philippines Constabulary, with resulting simplicity and no inconvenience.

These recommendations present the following advantages:

a. They are simple, comprehendable and workable.

b. The interests of the Government are better safeguarded.

c. A large reduction in paper work, both in field and central offices, results.

d. The methods advocated for the quartermaster in the field are equally applicable in garrison, and to all supply departments.

Description of a Trench Raid

By Our Special Correspondent

A MILITARY observer has made a very interesting report of a raid by a French detachment on the German trenches, early in the present year, for the purpose of capturing prisoners.

An enterprise of this sort is called a *coup de main*, and, as the communications from the front often mention the execution of a *coup de main* at some point along the line, a detailed description of such an operation may be of interest.

OBJECT

The object of the enterprise was to capture German prisoners in order to learn from them to what regiment and division they belonged.

At French General Headquarters there is kept a table of all the German organizations, with their various dispositions. It was known that some changes in the disposition of the German forces had recently taken place, and the French division commander had been ordered to execute the local attack by one of his regiments, to ascertain what German regiment was opposed to him in his front.

PREPARATION

The division commander directed the commander of one of his infantry regiments to submit a plan for a *coup de main*. The plan finally approved was to inflict a sudden and terrific bombardment on a small salient in the German lines, isolating it from rear and flanks by a continuous curtain fire, and to send a detachment of about ninety men over to take such prisoners as they might find in this salient.

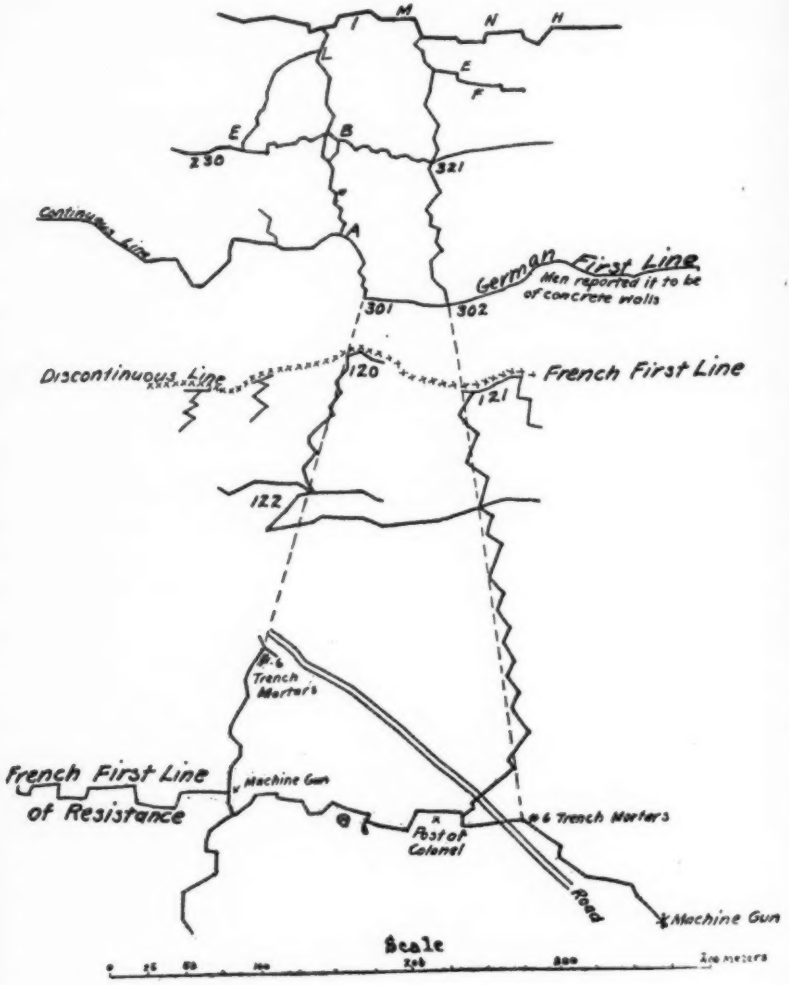
The *coup de main* was to be executed on a given date. The detachment chosen for the attack was sent to the rear, near division headquarters, and began special training for the operation. From aerial photographs taken of the German position, trenches identical with those of the salient to be attacked were prepared at the rear of the French line. Upon this ground the detachment was instructed daily in the simulated attack, each squad and man being assigned to the particular duties he was required to perform. The exercise might be likened to football signal practice.

The accompanying sketch shows the trace of the trenches to be attacked. In order that the detachment might reach the German trenches, the French trench mortars were to make breaches in the German wire entanglements, one at point 301, the other at 302. The French were to move forward from points 120 and 121, distant respectively only about 35 and 50 yards from the German front line. They were to operate in the trenches marked in heavy ink back to the German second line, about 200 yards to the rear of the first line.

The detachment was divided into four groups:

a. The first group, 1 officer and 18 men, was to advance along the communicating trench 301–A–B–L, sending flankers a few yards to their left to bar the trenches in that direction.

b. The second group, 2 officers and 37 men, was to advance along the com-


M
N
H
L
E
F
E
B
230
321
A
Continuous Line
German First Line
Men reported it to be of concrete walls
301
302
Discontinuous Line
120
121
French First Line
122
Trench Mortars
French First Line of Resistance
Machine Gun
Post of Colonel
Trench Mortars
Road
Machine Gun
Scale
Zoo meters

municating trench 302–321–D, cleaning trench I–M–D and also, for a distance not exceeding 60 meters, all trenches running to their right.

c. The third group, 1 officer and 16 men, was to operate between 301–302–321–B, clean the trench 321–B, assure liaison between the right and left groups, cover the return of the first and second groups and to return to the French lines after these groups.

d. The fourth group, the adjutant and 39 men, was to remain in the French first line as a support. The captain commanding remained with this group and had orders to send up a rocket signal for all his men to return at once as soon as German prisoners were brought in by any part of the detachment.

ARTILLERY

The French had twelve trench cannon divided into two groups and placed as indicated on the sketch: the left group, about 250 yards from point 301, where it was to make a breach in the barbed wire; the right group, about 400 yards from point 302, where another breach was to be made. The trench cannon were 58-mm. caliber and fired a winged projectile carrying about 40 kilos of explosive charge. Six batteries of 75-mm. guns and three batteries of 155-mm. howitzers participated in this action. There was one aeroplane to regulate artillery fire, and one to keep the division commander, who was some distance to the rear, informed as to the progress of the enterprise and to carry any orders he might have to transmit. These machines were fired on almost continuously by German anti-aircraft guns, but seemed to pay no attention to them.

THE OPERATION

The bombardment was scheduled to begin at 3.40 p. m. A few minutes before that time the men of the detachment were lined up in a communicating trench for a final inspection before moving down to the front. Each man wore white arm-bands so they might easily recognize each other; each was armed with one automatic pistol and ten hand grenades. Each group carried two smoke grenades. The men wore no overcoats, no regimental numbers, and carried no papers which would serve to give information to the enemy.

The men of the detachment talked among themselves and, while they were to some extent "keyed up," they appeared ready for their work and showed no signs of dreading it.

The observing officer took post near a dugout, marked (x), almost directly in front of the trenches to be attacked, and about 350 or 400 yards distant from them. At this place were stationed the captain commanding the trench mortars, the lieutenant in charge of the telephone system, and the first-aid station. This was a firing trench on high ground, looking across a slight depression, giving a good view of the gently rising ground in front where the operation was to take place.

The colonel took his post in a dugout about 50 yards to the right. He was connected with the artillery, the battalion commanders, the detachment commander, etc., by telephone. The attacking detachment took cover in dugouts just in rear of the front line. The afternoon was clear and still. Absolute quiet reigned at 3.39 and, suddenly, at 3.40 the three kinds of artillery opened fire; the trench mortars on the wire en-

tanglements; the 75's dropping a curtain of fire around the sides and rear of the salient to be attacked, and about 100 yards from it; the 155's firing at battery and machine-gun emplacements. The noise was terrific, and the ground shook with the explosions.

The Germans had no intimation of what was coming. The batteries had fired a few shots for adjustment that morning, but not at the point to be attacked, and this was an ordinary occurrence. The Germans replied, but not very actively, nor did they locate the French trench mortars. Their shots fell at random over a considerable territory in the vicinity of the French position.

Many of them fell near the group of trench mortars to the left. Twice during the operation a rumor came to report that the telephone line connecting the captain with this group of mortars had been cut by a shell; men went out each time to repair it. Once, while the line was broken, the lieutenant in command of these mortars came to announce that many shells were falling around them. He had run across open ground to save time and was breathing heavily. The captain inquired if any one had been hit and, on learning that one man had had part of his hand blown off, ordered that the firing continue. Later this lieutenant had one of his men killed, and still later another wounded. The German shells also tore up the French front line trenches in a few places in our immediate front, so that the men in them had to be drawn back.

By 4.40 p. m. the two breaches were made in the barbed wire. One could see, quite distinctly, pieces of wire entanglements, pickets, etc., flying in the air after each well-placed shot. Most of these shots were well placed; none were wild. At 5.10 the trench mortars directed their fire on the front line trench, but well to the flank of the German position to be attacked, so that the assaulting detachment could come down to the French first line trenches ready to move across. The trench cannon continued firing so that the time of attack would not be detected; they fired throughout the attack.

The captain commanding the detachment had been told that he could attack at any time after 5.20. At this time the curtain fire was moved outward to about 150 yards from the point to be attacked and surrounding it. Percussion shrapnel was used. The 155's continued firing.

The detachment advanced to the attack at 5.22. The men moved at a fast walk or double time, but very few were running. They only went as far as trench 321–B. They did not reach the line I–M–B–E–F. They found in the front line three unwounded Germans whom they brought back. They reported seeing five dead in these trenches. While crossing the open they were fired upon by a machine gun located somewhere to their left; no one was hit.

As soon as the three prisoners were brought into the French lines, the captain sent up a rocket recalling his men. This was at 5.28; all were back at 5.33. As they started back they threw smoke grenades which hid their movements, to a certain extent. At 5.35 the captain sent up another rocket, which notified the artillery that all his men were back.

COUNTER OPERATIONS

At 5.25 the Germans sent up a red and green rocket, which was later

learned to be a call for a barrage. This barrage began at 5.32 just before the last two Frenchmen were back; they fell to the ground at the first salvo, then jumped up and ran in. The German barrage was quite heavy and fell from the front line back to the line occupied by the colonel and other officers, who were obliged to take shelter, where they remained until about 6.30. Most of the projectiles were 150-mm. shells. The ground fairly shook with the explosions, but only a small amount of damage was done.

REPORTS AND CONCLUSIONS

The report of the division commander stated that the following artillery ammunition was expended:

Trench mortar projectiles..	1,212 shells
75-mm. projectiles.....	6,340 shells
155-mm. projectiles.....	1,690 shells

The operation was considered successful as it brought back prisoners who gave the information desired.

The report of the division commander contained the following conclusions drawn from this operation:

a. That to execute a successful *coup de main* a detachment must have at least eight days' special training over ground identical with that to be attacked.

b. That perfect liaison between the artillery, infantry, and aircraft is essential.

c. That there is great difficulty in taking prisoners from dugouts in a quick operation like this.

d. That it is best to place machine guns well to the flank of the position, so that they will not be involved in counter bombardment.

e. That the gas mask should be hung around the neck—no gas shells were used in this particular operation, but they frequently have been on similar occasions.

f. That the morale of the men is greatly augmented by their being able, under artillery protection, to go into the enemy's trenches and bring back prisoners without losses.

Field Fortification

Profile and Execution of Deliberate Field Works

THIRD LECTURE

1. *General Principles.*—Field fortification is divided into hasty or light, and deliberate. The directing principles are the same in both cases. The first develops into the second when the stay in one position is long enough to permit improving and completing the work executed at first in haste.

The strengthening of light field works, which were constructed under conditions explained in the preceding lecture, will have for its object:

(1) To increase the resistance to hostile artillery.

(2) To increase the protection offered to the occupants.

(3) To create sheltered communications: (*a*) With the elements of observation and advanced defense. (*b*) With the neighboring elements of the firing line. (*c*) With the rear, for supply, evacuations, command posts, reinforcements, etc.

(4) To place under shelter the personnel and apparatus for observation, illumination, and communication.

(5) To create shelters for the material, arms, ammunition, and emplacements and shelters for machine guns and trench weapons.

(6) To better living conditions in the trenches.

(7) To make the approaches to field works very difficult for the enemy.

PART I

INCREASE OF RESISTANCE OF TRENCHES TO ARTILLERY FIRE

2. *Deepening the Trench.*—The first step in strengthening the trench is to deepen and widen it. In this way are obtained:

a. The earth necessary for the strengthening of the parapet.

b. The space necessary for the revetment of the walls of the trench.

A minimum depth is 6 feet 8 inches; width at the top, 4 feet 8 inches; width at the bottom, 3 feet 4 inches.

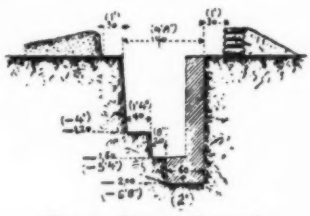


FIG. 1.—Deepened trench.

The work is progressive—from the rear part of the complete trench, the part hachured in the drawing is excavated. An intermediate step permits the rifleman to reach the firing banquette.

3. *Increasing the Strength of the Parapet.*—There is no longer any difficulty about increasing as much as possible the thickness and height of the parapet which protects the riflemen. Its strengthening is secured by the employment of sand-bags and by the construction of loopholes whose base should be at a maximum height of 5 feet.

4. *Revetment of the Walls of the Trench.*—Resistance to the destructive effects of fire on the trenches should be increased by revetting the walls of the trench. This can be done in several ways: from the light revetments described in the preceding lecture to the

construction of walls of reinforced concrete (Fig. 3). The proportions of cement, sand, and gravel or broken stone most used are (*a*) one of cement, two of sand, and five of gravel or broken stone; and (*b*) one of cement, three of sand, and six of gravel or broken stone. Steel rods are used for the reinforcement.

FIG. 2.—Arrangement to cause projectiles to burst.

5. *Arrangements to Cause Projectiles to Burst.*—At night narrow trenches may be dug in the parapet, which are filled with a layer of logs. These will cause a premature burst of projectiles which hit in front of it (Fig. 2).

6. *Concrete Revetment.*—By gradually increasing the amount of concrete, the work approaches the character of a

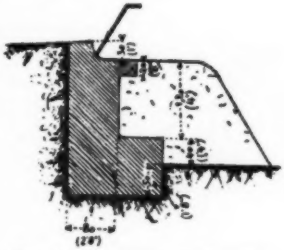


FIG. 3.—Concrete revetment.

permanent fortification. The interior walls may be revetted with concrete walls, and concrete traverses may be constructed at intervals of two or three yards. Steel loopholes may be placed, and a recess constructed in the front wall which will form an excellent shelter (Fig. 3).

PART II

INCREASE OF PROTECTION FOR THE PERSONNEL

7. *Protection of the Personnel in the Firing Trench.*—The trace should be a broken line, with traverses, splinter proofs, individual niches for the riflemen, and bomb-proofs with armored roofs.

8. *Traces of Broken Lines.*—The greatest danger against which it is necessary to protect the personnel is that of enfilade fire. The best means of

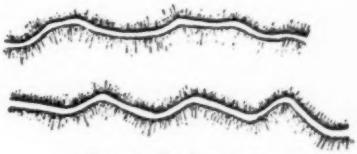


FIG. 4.—Broken trace.

protecting is to avoid traces of long, straight lines. When under fire it is not always possible to construct traverses at first, and they must often be constructed later. They may be replaced by:

a. Using a trace of a broken line (Fig. 4).

b. Using an indented trace (Fig. 5).

The perpendicular distance between the axes of the longer straight elements should not be less than 5 feet, and these elements should not be longer than 6 yards.

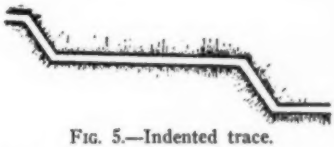


FIG. 5.—Indented trace.

9. *Traverses.*—The best method for defense against enfilade fire is to localize the effect of projectiles by employing traverses (Figs. 6, 7, and 8).

To give protection against the effect of heavy artillery, the traverse must be at least 2 yards thick on top. In places exposed to direct fire, this thickness

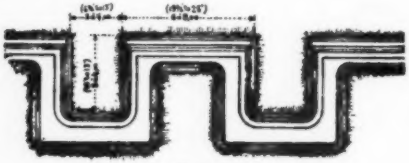


Fig. 6.—Traversed trace.

must be increased to 3 or 4 yards, depending upon the character of the soil. In depth, the traverse should project at least one yard beyond the face of the rear wall of the trench. The interval between traverses should be from 6 to 8 yards. In exposed places this interval should be reduced to 4 or 5 yards.

10. *Traverses Constructed after the Completion of the Trench.*—If practicable the traverses should be constructed simultaneously with the trench. If, however, the trench has been made without traverses, they should be con-

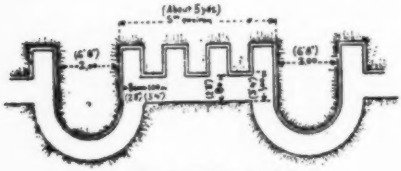


Fig. 7.—Individual niches.

structed as soon as practicable by obstructing a part of the trench with sandbags, boxes, barrels, gabions, etc., and a passage should be opened around them to the rear. When the traverses are wide, berms should be constructed on the sides, and a firing banquette should be constructed for flanking fire. This is especially necessary on the flanks of a trench and at the exits of a communicating trench.

11. *Individual Niches.* — In places particularly exposed to enfilade fire, individual niches for riflemen should be constructed between the traverses (Fig. 7).

These afford efficient protection against enfilade fire. They are often constructed in old trenches which have been damaged by projectiles or bad weather.

12. *Splinter Proofs.* — In trenches greatly exposed to artillery fire, splinter

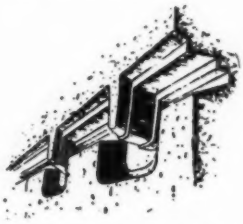


Fig. 8.—Perspective of traversed trench.

proofs should be constructed between the traverses. Their roofs should be just thick enough to protect against shell fragments and shrapnel, and they should be short so as to reduce as little as possible the length of the fire crest. They may be constructed of fascines, sand-bags, or gravel and sand between two layers of planks.

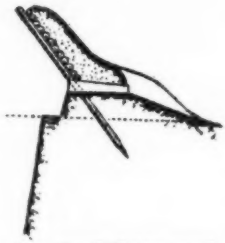


Fig. 9.—Splinter proof.

A form of splinter proof which can be readily constructed is shown in Fig. 9. It is made by driving stakes into the

parapet; on these are placed poles and a layer of earth a foot thick. If steel rails are available they may be used instead of the stakes and poles, and afford much better protection. The supporting rails should be braced by props set in the rear berm of the trench, and loopholes should be constructed.

The trench may be covered as shown in Fig. 10. Parts of the trench should

Fig. 10.—Covered trench.

be left uncovered—one for a section of each company—to enable troops to leave the trenches for an attack. The dimensions of the trench are not modified.

If sufficient logs are available, a double roof may be constructed (Fig.

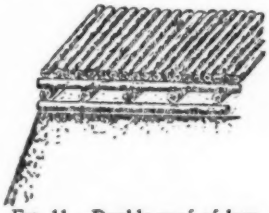


Fig. 11.—Double roof of logs.

11). Two layers of logs with a foot of earth between form a cover capable of resisting a 150 mm. (5.9 in.) high explosive shell.

A covered trench with an open passageway (Fig. 12) may be constructed from the standing trench by widening the trench. It forms an excellent continuous shelter and does not interfere with an advance or render the defenders

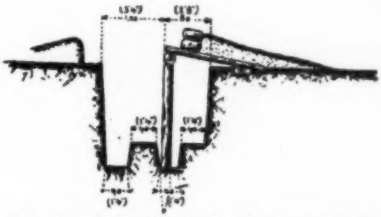


Fig. 12.—Covered trench with passageway.

liable to be bottled up, as does the covered trench shown in Fig. 10. The protection can be increased by increasing the number of traverses and making individual niches of gabions, fascines and sang-bags (Fig. 13).

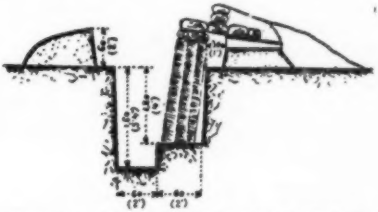


Fig. 13.—Covered trench with individual gabion traverses.

13. *Head Cover.*—Head cover is the term applied to any horizontal cover which may be provided above the plane of fire. It is obtained by notching or loopholing the top of the parapet.

(1) *Notches.*—When the relief of a trench is too great for a man to fire standing, or when the height of the parapet is more than a foot above the level of the ground, notches should be made in the parapet. The simplest way to make these and give support to their sides and make them the least visible is to arrange sand-bags on top of the parapet as shown in Fig. 14.

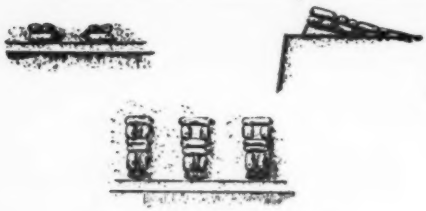


FIG. 14.—Sand-bag notches.

(2) *Loopholes.* — When overhead cover is used, loopholes are necessary. They may be collective, as shown in Fig. 10, or individual, constructed of sand-bags, wood, steel, hurdles, etc.

FIG. 14a.—Loopholes of sand-bags.

a. Loopholes of sand-bags.—These can be rapidly constructed, afford good protection and are easily concealed. Their strength can be increased by using planks or light poles under the sacks. About sixteen sand-bags are required to a loophole.

b. Steel and wooden loopholes.—These should be prepared in the rear. They require 9 to 10 square feet of

FIG. 15.—Side of a wooden loophole.

boards, 1 to 1½ inches thick, and 40 nails, 2 to 3 inches long. Two carpenters can make a loophole in an hour. Steel plates decrease the visibility and greatly increase the protection. They should have an opening with a movable cover, and should be placed at the rear of the loophole.

c. Loopholes of hurdles. — When boards or steel plates are not available, loopholes may be constructed or hurdles or woven brush. The dimensions should be the same as those shown in Fig. 16.

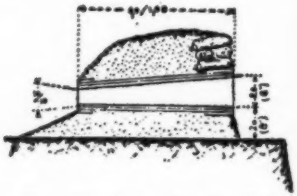


FIG. 16.—A wooden loophole.

d. Loopholes of steel rails.—These may be constructed of two pieces of rail, not more than a foot long, placed vertically at an angle to each other, with

FIG. 17.—Loopholes of steel rails.

an interval of an inch or two for firing through. The webs of the rails may be reinforced with 3-inch wooden strips to prevent bullets penetrating, and blocks should be used to hold the rails apart. Pieces of rail may also be used to form a narrow, horizontal opening, an inch or two high.

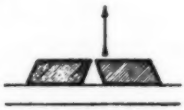


FIG. 18.—Loophole of folding gabion.

e. Loopholes of folding gabions (Fig. 18).—The folding gabion is made of boards hinged together. They can be formed into parallelograms of different angles and thicknesses and are very convenient for making loopholes.

(3) *Shields.*—These are of two kinds, the portable and the parapet.

a. The portable shield (Fig. 19) is intended for fighting in the open, but may be used on a parapet. It is made of special steel, 20 inches square and .33 inch thick; weighs 33 pounds, and will resist an ordinary bullet at short range.

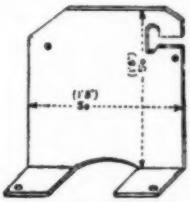


FIG. 19.—Portable shield.

It has a loophole, two folding feet, and four holes for the attachment of a carrying cord. The cord can be arranged so that the shield can be carried on the arm when under fire, or on the back when not under fire.

b. The parapet shield is specially made for use as a loophole, but it can be utilized when crawling forward (Fig. 20). It is made of special steel, 2 feet

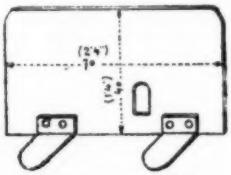


FIG. 20.—Parapet shield.

4 inches by 1 foot 4 inches and .43 to .47 inch thick; weighs 66 pounds, and will resist an armor-piercing bullet at all distances. It has a rectangular loophole 2 by 3½ inches. When these shields are assembled on the parapet, they should be placed from 1 to 2 feet apart (Fig. 21), one in front of the other, and the loopholes connected with wooden boxes covered with sand-bags or earth.

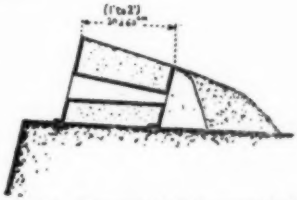


FIG. 21.—Parapet shield assembled.

c. Shields of steel, or wood and sand, or gravel (Fig. 22) can be made of a thickness to resist bullets (see Lecture I, Part IV). Loopholes or notches 2 by 3½ inches should be made on the fire crest, at intervals of a yard.

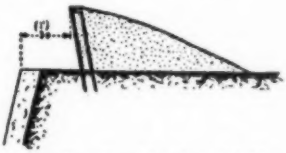


FIG. 22.—Combination shield.

An individual shield of steel and sand, 2 feet by 1 foot 4 inches, can be made with steel sheets .12 inch thick. They are bound with angle iron, which is also used to form stakes (Fig. 23). Two sheets are fastened 2 inches apart

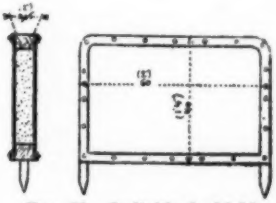


FIG. 23.—Individual shield.

with wooden strips between them, and the space filled with sand. They are bullet proof at a distance of 10 yards.

14. *General Remarks on Head Cover.*

a. It should be concealed by using grass, brush, canvas, empty sand-bags, etc.

b. The sky as a background should be avoided by raising the parados or placing a canvas curtain behind the rifleman's head and closing the opening

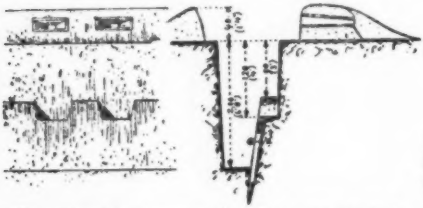


FIG. 24.—Arrangement for fire over parapet.

with a cover which can be removed when the loophole is in use.

c. In addition to its visibility, head cover has the disadvantage that it causes a pause in the fire of the defender when the attack reaches the most deadly zone of fire, because the defenders have to withdraw their rifles to prepare for bayonet fighting. It is therefore necessary to arrange for fire over the parapet. For this purpose banquettes can be constructed of sod, stone, logs or scaffolding between the loopholes (Fig. 24).

d. In some sectors the loopholes have their axes inclined to the normal.

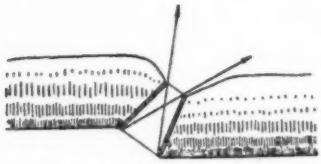


FIG. 25.—Loophole placed obliquely.

e. Every loophole intended for observation should be placed obliquely in the parapet in order to be protected against shots from the front (Fig. 25).

f. In some sectors loopholes should not be used at all.

15. *Shelter under the Parapet.*—These shelters for rest and protection against artillery fire can be rapidly and easily constructed (Fig. 26).

They must:

a. Not interrupt the line of fire.

b. Be capable of execution after the trench is finished.

c. Permit a rapid sortie.

They should be about 3 feet 4 inches wide, 5 feet high, and 6 feet 8 inches long; and will shelter from 6 to 8 men. The overhead covering should be at least 3 feet 4 inches plus the height of the parapet. In earth they should be lined. Wooden steps should replace the

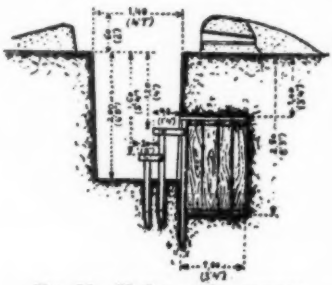


FIG. 26.—Shelter under parapet.

firing banquette, which must be removed in excavating the shelter.

PROTECTION FOR THE PERSONNEL IN THE IMMEDIATE VICINITY OF THE FIRING TRENCH

16. During a heavy bombardment which renders the trenches untenable, the personnel must be sheltered so that it will be available at the moment of assault. For this purpose shelters should be constructed with logs, earth, steel rails, concrete, and by sinking them from 25 to 40 feet under solid ground.

To limit the effects of hits, only small shelters should be used. Their maximum capacity should be from one to three squads. In the first line there must be a number of shelters so that the men who must be kept there under the most violent fire will be completely sheltered. In the rear lines and in the communicating trenches it is necessary to have numerous strong shelters for the large garrison that must be stationed there.

These shelters should be constructed on branches from the fire trench or from a communicating trench, at a distance of 10 to 12 yards from the fire trench.

17. *Cave Shelters under the Parapet.*—The advantage of these is due to the fact that they can be located close to the fire trench (Figs. 27, 28 and 29). The protection can be increased by placing a layer of steel rails on the surface of the ground to cause projectiles to burst. Two entrances should be provided, as they are liable to be obstructed by caving in. The entrances should not be placed on opposite side of a traverse, as a hit on it might obstruct both entrances. Observation from them may be pro-

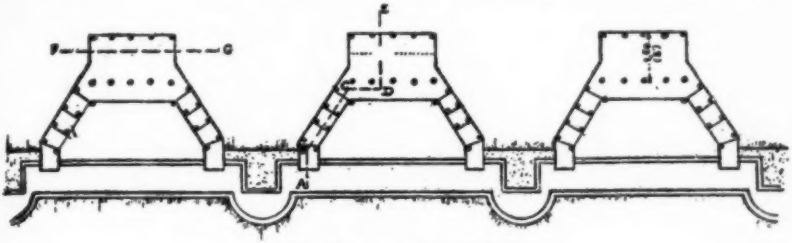


FIG. 27.—Plan of cave shelters.

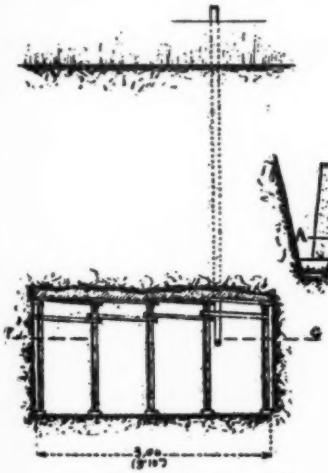


FIG. 28.—Section *F-G*.

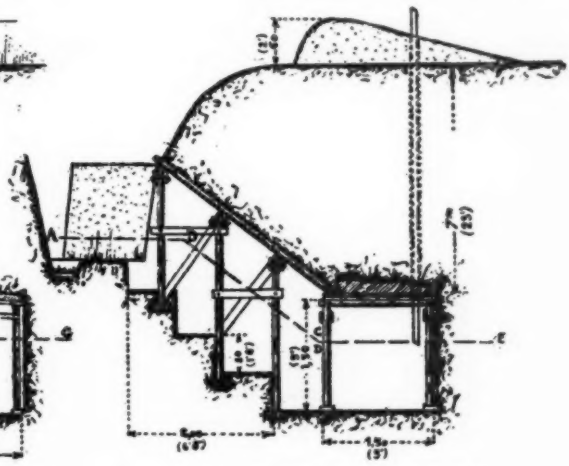


FIG. 29.—Section *A-B-C-D*.

vided by boring a hole with an earth auger to the surface of the ground, in which a periscope can be used. Ventilation is obtained in the same way. As the shelters are liable to cave in, especially at the entrance (picks and shovels should be stored in them and arrangements made for their ventilation.

18. *Shelters in Rear of the Fire Trench.*—These must be situated so that the personnel sheltered in them can man the firing crest in the minimum of time. They are on branches from the communicating trenches, immediately in rear of the fire trench, or on special trenches constructed for the shelters (Figs. 30 and 36).

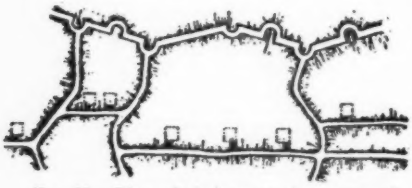


FIG. 30.—Plan of shelters on the communicating trench immediately in rear of the firing trench.

a. On the communicating trench immediately in rear of the firing trench.—

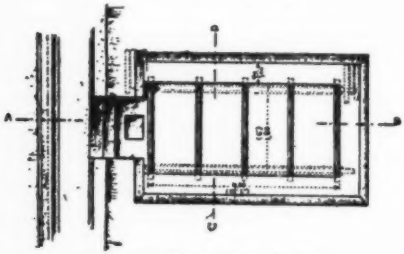


FIG. 31.—Plan of a shelter.

This trench is usually from 10 to 12 yards in rear of the firing trench and is called the circulating trench. The dimensions of the shelter, the height of the ceiling, and the arrangement of the woodwork are shown in Figs. 31 to 35. By reducing the height of the ceiling, the height of the earth thrown out on

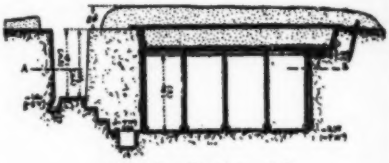


FIG. 32.—Section *A-B*.

each side of the communicating trench is diminished. The normal height of the ceiling is 6 feet; as the height of the earth thrown out must not exceed 2 feet to 2 feet 4 inches and as the depth of the communicating trench is from 5 feet 4 inches to 6 feet 8 inches, the level of the floor of the shelter will be at 7 feet 10 inches. Drainage should be provided

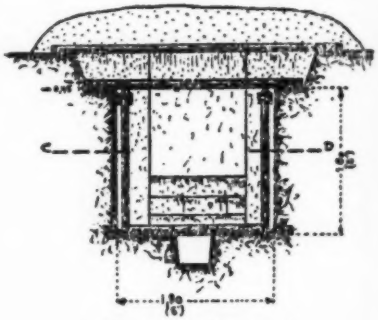


FIG. 33.—Section *C-D*.

for by constructing a drainage pit. One, or better, two entrances should be constructed from the communicating trench, and the shelters should be connected if possible. The ceiling beams should be given as much bearing as possible on the side towards the enemy, and on each side about a yard. To protect the ceiling against the effects of blast, the logs should be bound together with cross pieces, held together with wire.

which should be fastened to stakes firmly driven into the ground.

FIG. 34.—Details of construction.

The posts and caps should be connected with iron straps and bolts as shown in Fig. 34.

A more rapid but weaker method of construction is shown in Fig. 35. A

FIG. 25.—Rapid construction.

good method of resisting lateral pressure is very important.

The walls of the shelter should be revetted by the methods described in the second lecture.

for the shelters.—In certain sectors, deep shelters are arranged on both sides of a special communicating trench constructed for that purpose (Fig. 36).

This communicating trench is situated between the fire trench and the circulating trench. Their construction is similar to that of shelters under the parapet of the firing trench. They possess certain advantages for the proper supervision and assembling of the per-

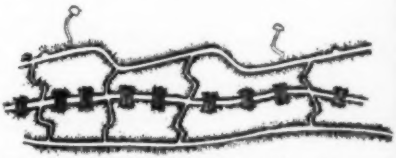


FIG. 36.—Plan of shelters constructed on a special communicating trench.

sonnel sheltered. The trench is completely covered where the shelters are constructed, and the covering is made up of successive layers of logs and earth (Fig. 37).

c. Cave shelters.—Cave shelters are constructed by the methods used in military mining. They are placed from 25 to 30 feet under solid ground, and are used for the first lines and for strong points. They should be supplied

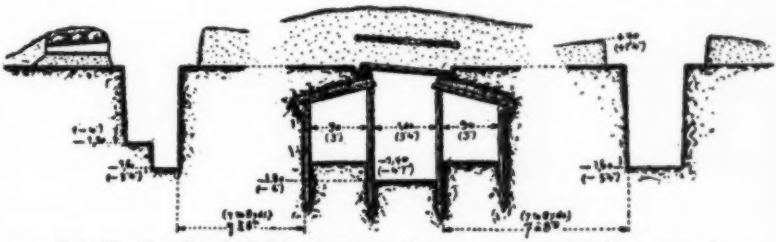


FIG. 37.—Details of shelters constructed on a special communicating trench.

For ventilation, heating, drainage, and protection again asphyxiating gas and caving in of the walls, see paragraph 21.

b. On special trenches constructed with material, ammunition and rations for several days. They are also used to shelter the command posts (par. 52) of all units. The dimensions vary ac-

cording to the garrison and use (Figs. 38–40).

Their height should be at least 6 feet 8 inches, width 10 feet, length variable, but their capacity should under no cir-

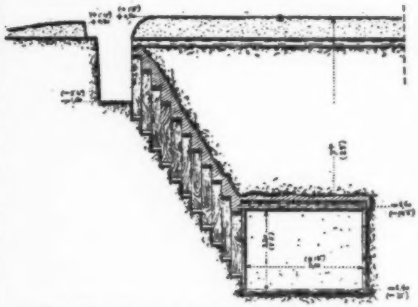


FIG. 38.—Cross-section of a cove shelter.

cumstances exceed that for three squads. The men sheltered should be able to get complete rest. Two tiers of cots or hammocks should be arranged against the walls. There should be two entrances, covered in the communicating trench by rifle or machine-gun fire from a traverse blockhouse (par. 21).

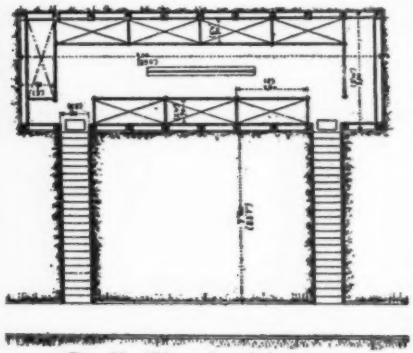


FIG. 39.—Plan of a shelter cove.

The framework and sheathing of the shelters and the galleries for entrance are constructed in accordance with the methods of military mining described in the sixth lecture.

The shelter shown in Figs. 39 and 40 is intended for a garrison of 25 men. Of these 2 would be on watch and 6 on picket duty, leaving 17 men off duty. For these there are 16 cots 6 feet by 2 feet 4 inches, arranged in tiers as shown, and a space at the right for the commander. Hammocks may be used instead of cots; they leave more space and are more comfortable.

By reducing the size of the shelter to a length of 20 feet, width 6 to 8 feet, height 6 to 8 feet, 18 men can be sheltered, 8 lying down and 10 standing.

At the upper end of the entrance gal-

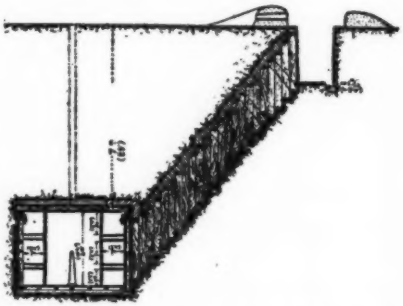


FIG. 40.—Cross-section of a cove shelter and entrance gallery.

lery there should be a niche, with a loophole for a man on watch.

PROTECTION OF THE PERSONNEL IN REAR OF THE FIRST LINES

19. *Shelters for the Reserves* intended for counter attacks, rest shelters in the zones in rear exposed to the bombardment of heavy artillery, are organized in accordance with the preceding principles. However, it is possible to utilize more fully the natural features of the terrain such as steep slopes, sunken roads, quarries, etc.; cellars of houses, and the concealment and protection of woods and forests. The con-

struction can be made stronger as there are more time, more materials and workmen available, and a relative security due to invisibility.

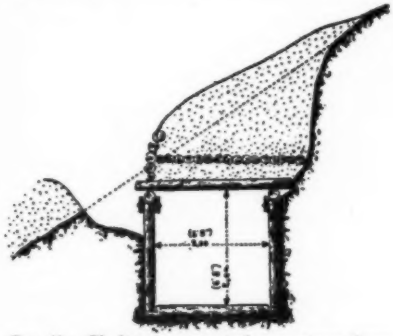


FIG. 41.—Shelter constructed on a steep slope.

a. Shelters utilizing natural features of the terrain (Figs. 41–45).

b. Shelters utilizing the cellars of houses.—The cellars should be connected by underground passages. The arches on the first floor should be covered with a thick layer of sand-bags, and a floor constructed to cause projectiles to burst. Ventilation should be carefully arranged and protected. Numerous exits must be provided for lateral communication and to the rear. All unnecessary openings should be strongly closed to prevent the entrance of projectiles.

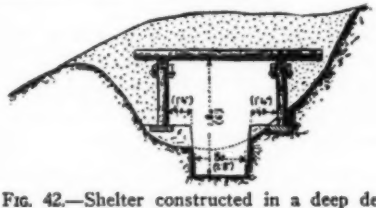


FIG. 42.—Shelter constructed in a deep depression of the ground.

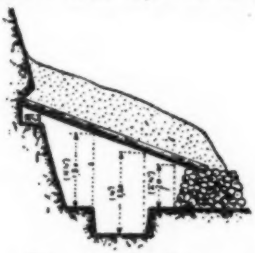


FIG. 43.—Shelter constructed in a sunken road, utilizing a pile of rock.

FIG. 44.—Shelter in a quarry.

c. Shelters in woods (Figs. 46 and 47).—The height of these shelters and the quantity of material required make this construction possible only in woods. Alternate layers of logs and earth for the walls and roof afford protection from fire. The dimensions are variable, but they should provide cots or ham-

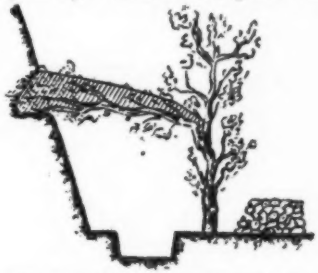


FIG. 45.—Shelter constructed in a sunken road, utilizing a line of trees.

mocks for 25 to 30 men. The cots are 6 feet by 2 feet 4 inches, constructed with a frame of wood covered with wire netting.

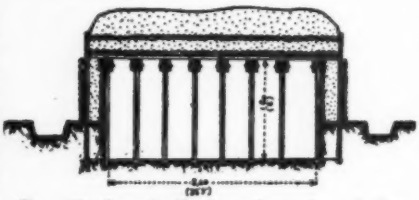


FIG. 46.—Longitudinal section of a shelter in woods.

20. *Methods of Strengthening Shelters.*—When a position is occupied for considerable time, the shelters may be strengthened by a proper combination of wood, broken stone, steel and concrete. A covering of 1 foot 8 inches of concrete affords protection against direct hits of the 105 mm. (4.13 inch) field howitzer; of 3 feet 4 inches, against those of the 130 mm. (5.12 inch) and 150 mm. (5.9 inch) mortars; of 6 feet 8 inches, against the 210 mm. (8.27

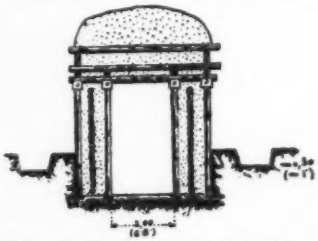


FIG. 47.—Cross-section of a shelter in woods.

inch) mortar. By reinforcing the concrete with steel bars, steel rails, and wire mesh, the resistance is greatly increased. Concrete should be poured over a layer of steel rails or logs for the roof, and the walls and floor should be similarly concreted.

a. Roof of earth and steel rails with an intermediate layer of stone (Fig. 48). —The rails are placed on heavy sills such as cross ties (Fig. 51), side by side and firmly fastened together with wire. A second layer is added if practicable, or a layer of earth from 1 foot to 2 feet thick, then a layer of broken stone 2 feet thick, and on top a second layer of earth from 2 to 3 feet thick. The total thickness of the cover should be from 5 to 7 feet.

b. Roof of timber, earth and an intermediate layer of broken stone (Fig. 49).—This roof consists of two or three

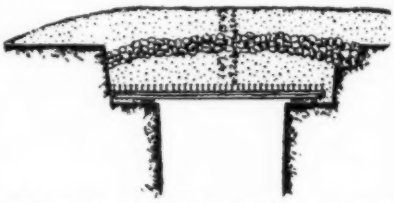


FIG. 48.—Roof of earth, broken stone and steel rails.

layers of timber. Between these are placed layers of earth, 12 inches thick to deaden shock. An intermediate layer of broken stone, with concrete poured over it if possible, greatly increases the protection. It has little height above the ground, affords great protection, and can replace cave shelters.

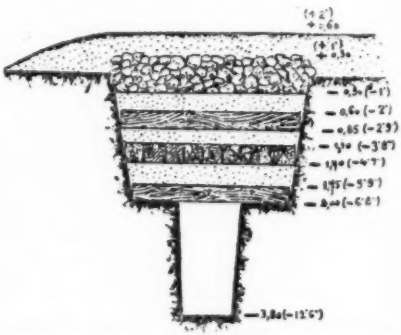


FIG. 49.—Roof of earth, timber and broken stone.

c. Roof of earth, broken stone, concrete and steel rails (Fig. 50).—This kind of shelter is specially suitable for the protection of assembly places near the first lines. The trench is broken by traverses 8 feet 4 inches thick and 5

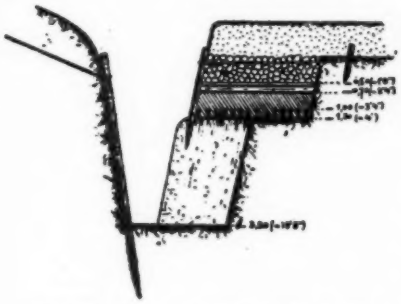


FIG. 50.—Roof of earth, broken stone, concrete and steel rails.

yards apart. The rails should be at least 8 yards long for the longitudinal layer and about 3 yards for the transverse layer. They will then have bearing of 4½ feet on the traverse on each side. It is important to provide a proper bearing for each layer of rails, not only on the traverses but also on the front side of the trench.

FIG. 51.—Detail of arrangement of steel rails.

d. Shelter of corrugated iron.—Corrugated iron is neither proof against bullets nor the fragments of artillery projectiles or those of trench weapons, but it can be used to support the thickness of the earth which gives the necessary protection. Its great advantage is that, with it, the construction of the shelter, once the excavation is finished, is rapid and easy.

21. *General Remarks on Shelters.*

a. Security.—A shelter is only valuable when it affords protection to the garrison and is so arranged that they can leave it promptly in case of an attack. Its roof and walls should be thick enough to resist penetration of the projectiles fired against it (see the second lecture, where the required thickness of various materials is given).

In order that the garrison may leave it promptly in case of attack, there must be a look-out placed to one side of the shelter in a protected niche, sunk into the parapet, concealed and furnished with means to communicate with the shelter to give the alarm; if the means of communication is interrupted, the look-out must leave his post.

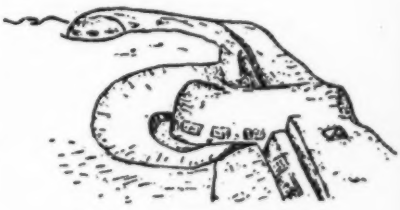


FIG. 52.—Traverse blockhouse.

To give the garrison time to get out, even if the enemy be actually in the trench, it is necessary to construct *traverse blockhouses* at intervals. These should cover the exit of the shelter and its vicinity (Fig. 52). The firing position communicates with a shelter for several men with rifles or automatic rifles, who can enfilade the trench. The blockhouse is constructed of rails and concrete. Besides the positions for the look-outs, a certain number of shelters should be provided with means for using long periscopes from the inside

(Fig. 40). When an attack is expected the officers and noncommissioned officers remain in the shelter with their men.

b. Arrangements to cause projectiles to burst.—As has already been explained in paragraph 5 for the parapets, and in paragraph 17 for cave shelters under the parapet, the protection of the personnel can be greatly increased by causing projectiles to burst in front of the shelters by using layers of logs, or above the shelters by using steel rails in the roofs.

c. Protection from rain.—Rain-water filters through all soils, especially through loose earth that has been placed over the shelters. Protection is secured by placing, on one layer of logs, roofing paper, corrugated iron, tin or zinc, linoleum, canvas, tiles, etc.

FIG. 52a.—Ventilation arrangement.

d. Drainage.—It is necessary to provide drainage for water which runs into the shelter through the entrance or seeps through the walls. A pit should be dug near the entrance and the floor of the shelter should be sloped towards it; the pit must be emptied when necessary.

e. Ventilation and protection against asphyxiating gas.—Ventilation is secured by boring vertical or inclined holes with an earth auger through the roof. These can also be used for periscopes (Figs. 40 and 52). Against asphyxiating gas it is necessary to hermetically seal the shelter as soon as the alarm is given. For this purpose two curtains of canvas or blankets are placed at the entrance, a certain distance apart. There must always be a barrel of a solution of hyposulphate of soda in the shelter, which should be sprayed into the air.

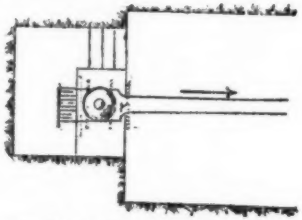


FIG. 53.—Plan of heating system.

f. Protection against caving in of the walls.—The walls should be revetted by the methods described in the second lecture. Picks and shovels should be stored in the shelter so that the garrison can dig their way out; an earth auger should also be available so that ventilation can be secured and a hole made rapidly for food and water to be passed into the shelter. There should also be stored in the shelter, food, ammunition, grenades and rockets to warn the lines in rear.

g. Heating is provided by cast iron stoves, or, if stoves are not available, by braziers placed in niches below the level of the floor of the shelter and at

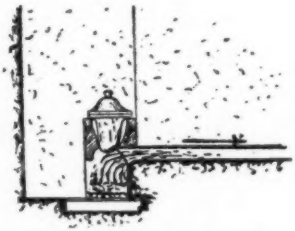


FIG. 54.—Cross-section of heating system.

one end of it (Figs. 53 and 54). If the shelter is long, the flue is carried through its length so as to get the maximum of heat. This pipe is made by a

FIG. 55.—Flue made of tiles.

trench 3 by 5 inches covered with tiles (Fig. 55). The tiles should be arranged as indicated in the figure, with reference to the direction of the smoke, and the joints should be calked with

FIG. 56.—Flue pipes.

FIG. 57.—Flue of tin or iron sheets.

clay; or by using stove pipe, drain pipe, or gas pipe (Fig. 56); or with sheets of tin or iron to cover a trench (Fig. 57). The pipes are banked with tamped earth to keep them in place.

PART III

CONSTRUCTION OF SHELTERED COMMUNICATIONS

22. *General Principles.*—It is necessary to communicate with ease, rapidity and security:

a. Toward the front with the advanced elements of observation, such as small posts, listening posts, etc.

b. Laterally with the adjoining elements of the firing line.

c. Toward the rear with the food and ammunition depots, the command posts, and the reserves.

A distinction can be made, according to the length of occupation of the position, between improvised communications and sunken communications. The first belong to light field fortifications; they are arranged rapidly with the main object of screening the movements of troops from the view of the enemy, as there is not time enough to shelter them from fire. In woods this is easily secured, but it is necessary to place signboards for use during the day, and lanterns at night, which will indicate the routes to be followed.

Lateral communications.—A communicating trench with a firing crest, protected with barbed-wire entanglements, should connect the centers of resistance, thus forming a continuous line of trenches and preventing the enemy penetrating between the strong points.

Communications to the front and rear.—These connect up the successive lines of trenches. They should be protected on both sides by barbed-wire entanglements. Some are arranged for firing and are provided with a firing banquette and elbow support.

23. *Ordinary Communicating Trenches* (Fig. 58).—The relief must not be less than 6 feet; it is usually 6 feet 8 inches. They should be concealed as much as possible by making the parapets not more than 1 foot 4 inches to 2 feet high, and giving them a flat slope and rounded crest. The earth should be spread out and the exterior slope of the parapets made uniform so that grenades that fall on it will roll away from the trench. There should be a berm of about a foot on both sides to:

a. Prevent the earth from falling into the trench and making it muddy.

b. To form a small platform for tools, packs and rifles, and to give more space for two columns to pass each other.

c. To permit infantrymen with packs to leap over the trench.

When water or rock is near the surface it is necessary to make the parapets

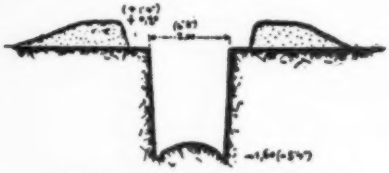


FIG. 58.—Communicating trench.

higher, and in some places no trench can be dug and parapets must be made of gabions, sand-bags, etc.

The width varies with traffic through it, but it should be at least 3 feet 8

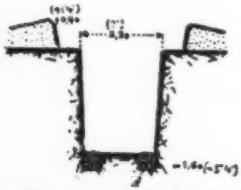


FIG. 58a.—Communicating trench.

inches at the top and 3 feet at the bottom. The bottom of the trench should be constructed and maintained slightly convex for drainage, or a ditch, filled

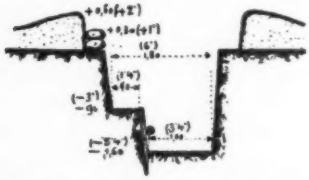


FIG. 59.—Communicating trench with single fire crest.

with small stones, should be constructed on both sides. To allow troops to move in column of twos the width should be increased to at least 5 feet; for the movement of vehicles such as artillery and supply wagons it should be 8 feet 4 inches. In this case the relief should be increased to from 9 to 10 feet. The trench should be widened by 2 feet 8 inches to 3 feet 4 inches at certain distances to permit men to pass each other.

24. *Communicating Trenches Arranged for Firing* (Figs. 59 and 60).—When it is necessary to arrange for firing on one or both sides, as the parapet

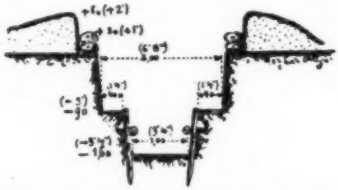


FIG. 60.—Communicating trench with double fire crest.

already has a height of at least 1 foot 4 inches, it is usually raised to 2 feet; and as the relief for firing must not exceed 5 feet a banquette at least 3 feet below the surface of the ground must be con-

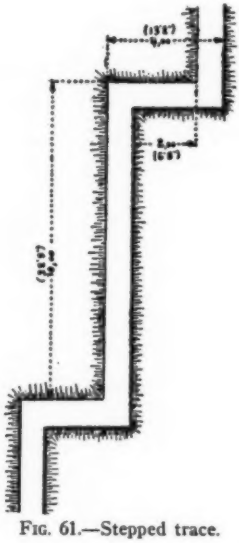


FIG. 61.—Stepped trace.

structed. If it is undesirable to widen the trench for this purpose, wooden benches may be stored in passing places so that they can be set in place rapidly when it is desired to open fire.

25. *Trace.*—When the construction of communicating trenches is hurried and they are not traced with stakes and compass, they are usually given a trace with gentle curves, which do not protect from enfilade fire and cannot be defended by flank fire. The only traces that should be used are: (*a*) the stepped (Fig. 61); (*b*) the traversed (Figs. 62 and 63), both of which are easy to con-

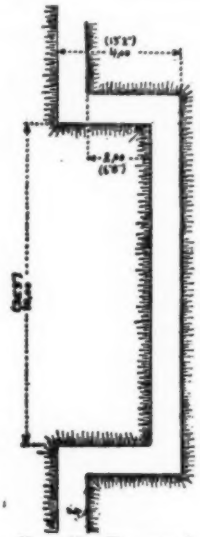


Fig. 62.—Traversed trace.

struct and to defend; and (*c*) the zigzag (Fig. 64), which gives better defilade and provides numerous flanking elements.

The stepped and traversed traces are preferable for approaches that are used for bringing up men and supplies, as they are shorter; the zigzag trace is better for the evacuation of wounded, as the litters can be carried around the turns easier. The angle between two branches should not be less than 30 degrees in order not to make the length of the trench too great. The longer

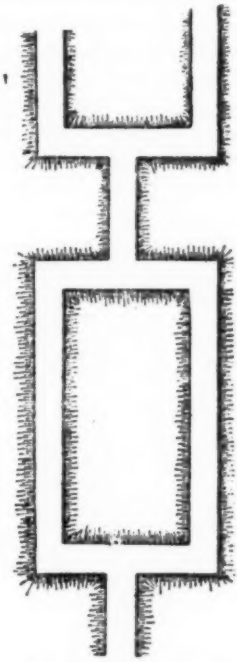


Fig. 63.—Island traverse.

branches of the stepped and traversed trenches should not have a length greater than 10 yards in order to defilade it; the short branches should be at least 4 yards long, so as to project at least 2 yards beyond the longer branches.

The zigzag trace is executed in the following manner:

a. The direction of the approach being determined by a line *NM*, give to the first branch *ab* a length of 4 to 6 yards, and an inclination of 30 to 45 degrees, and place the middle of the cord

representing the exterior edge of the trench on the line *MN* at a point x^1.

b. Then lay off on *MN* the distances x^1x^2, x^2x^3, etc., equal to double the distance of x^1 from the front edge of *AD*. Place stakes to mark these points.

c. Two men placed at the ends of the cord *ab* alternately stretch the cord from *b* to *c* and the man on the right places the stake *c* when the cord *bc*, stretched, is in contact with x^2.

In the same way, the man on the left places the stake *d* where the cord held at *c*, and stretched, passes the stake x^3.

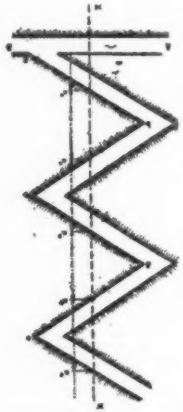


FIG.—Zigzag trace.

d. Then join the points *a*, *b*, *c*, *d* and outline at 3 feet 4 inches or 3 feet 8 inches the trace of the interior edge of the trench. Round off the angles.

Continuity of the trace (Fig. 65).—A part of a parallel should never be used as part of an approach, as *DABC*. Besides causing confusion it renders passage through the approach difficult when the parallel is occupied by troops. It should be remembered that the rate of travel through an approach is that at its most difficult point, such as at a tunnel under a road, a bridge, water hole, etc. A connecting trench, as *AC*, should be dug.

Trace at the angles.—Whatever form of trace is used, the passage around the

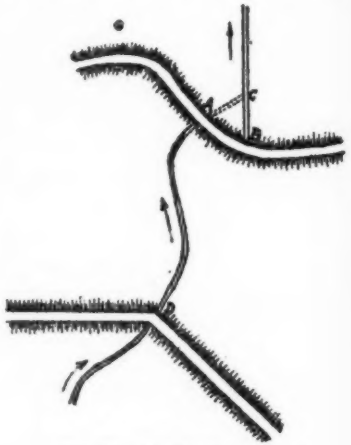


FIG. 65.—Continuity of trace.

angles in the trace should be easy and permit the passage of litters for wounded, especially in the approaches for the evacuation of the wounded. This result is obtained in the following manner:

FIG. 66.—Trace at obtuse angle.

a. For obtuse angles, round off the reentrant angle and blunt the salient angle (Fig. 66).

b. For right and acute angles, widen or round off the angles (Figs. 67 and 68).

26. *Execution.*—When sheltered from the enemy's fire, or at a distance, or at

night, the approaches are constructed in a manner similar to the construction of trenches as explained in the second

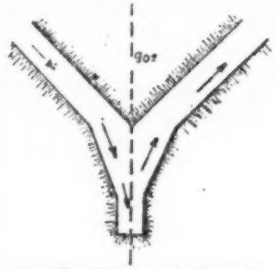


FIG. 67.—Trace at right angle.

lecture. Work at night is specially recommended.

Under fire of the enemy, when it is necessary to join the first lines with elements of a captured trench, with a

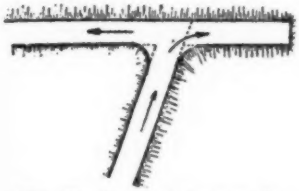


FIG. 68.—Trace at acute angle.

listening post, or with a mine crater, the methods of sapping or the methods of mining described in the Engineer Field Manual are used according to the circumstances. These methods are described in the sixth lecture.

27. *Tracing.*—The construction of an approach should be preceded by carefully staking it out with careful measurements. The measurements are necessary in order to secure economy of time and to permit the clear formulation of orders for the conduct and completion of the work.

28. *Signposts.*—At all branches there should be placed in each branch two solid signposts, planted firmly in the berm beyond reach of accidental blows and in a niche where a lantern can be placed, and placed so that they will attract the attention of men passing in either direction. The approaches should be named, and these names should be kept all the way through, as they constitute important reference lines in maps of the defenses. Besides signposts, the principal approaches are distinguished from the minor ones by making them from 1 foot to 1 foot 4 inches deeper at all forks or crossings.

29. *Stairs, Storage Places, Foot-bridges, Niches.* — Frequent storage places and steps for leaving the approaches should be provided. Steps are also necessary at the crossings of other approaches or parallels; these are used at night, with a foot-bridge over the principal approach. By providing two stairways, the rate of march through the approach will not be decreased much. Foot-bridges may be constructed over all the trenches which cross an important approach, and these, with a path parallel to the approach, may be used at night in order to supplement the approach and lessen the time required to reach the front.

There is a tendency to dig, by individual initiative, shelters and niches in the approaches; this tendency should be repressed. Everything tending to cause a halt, hence loss of speed, must be prohibited. An approach should be kept absolutely clear, and nothing should open into it except other approaches.

30. *Bridges over the Approaches.*—These should be constructed in proper places, with a layer of logs.

31. *Covered Approaches.*—On particularly exposed points, the approaches should be covered with splinter-proof

roofs, constructed according to the principles of the roofs of shelters, as previously described.

32. *Dispositions for Defense.*—The lateral communicating trenches and the approaches can in certain cases be arranged like firing trenches and can be protected by barbed-wire entanglements. They assist thus in the defense of the front and in the flanking dispositions for the intervals between the supporting points.

Moreover, the approaches should be organized so that they can be defended by rifle, grenade and machine-gun fire over every foot, and they should be arranged so as to trap the enemy if he should get into them.

The dispositions for defense by rifle and machine-gun fire can be organized at a distance from or at one end of a straight line of approach. If the rifle or machine gun is placed at a distance to facilitate the fire, sections 1 yard in length will be removed from the parapet of the approach. Sometimes it will be necessary to cut away part of the side of the approach. At the end of a straight line of approach the arrangement will comprise a small firing trench, a yard long, provided with one or two loopholes and with a position for a grenade thrower immediately behind the firing trench (Figs. 69 and 70).

FIG. 69.—Cross-section of an arrangement for the defense of an approach.

The traps will consist:

a. In making island traverses or blind approaches, and of placing false walls on the opening of one of the two trenches around the traverse. The enemy having passed the island traverse, or opening of the blind approach, will be at the mercy of the defenders hidden in the part concealed from view.

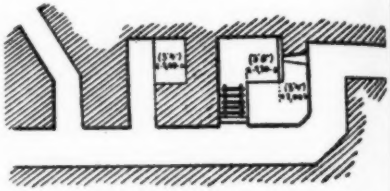


FIG. 70.—Plan of arrangement for the defense of an approach.

b. In closing with a false wall the opening of a shelter where the defenders can act in the same way.

c. In making, outside the approach and in its immediate vicinity, holes where defenders can be hidden who can isolate advanced hostile groups.

d. In making false approaches which rise gradually to the ground level. When the heads of the enemy appear, riflemen posted in a proper position can shoot them down.

33. *Maintenance.*—The trenches and approaches, after prolonged use, deteriorate, not only from the fire of the enemy but also from the effects of the weather. They must constantly be repaired. Walls which break down must be revetted. Firing banquettes must be constantly repaired with planks, fascines, etc. Damaged parapets must be repaired. Berms must be kept at proper width. Drainage pits must be watched carefully and kept cleaned out. It requires constant work to keep the trenches clean and sanitary. Any commander who tolerates lack of work or poor work under any pretext is wanting in the first duty of a commanding officer.

When parts of trenches or approaches are captured, steps must be taken immediately to clear them of insects which swarm there and transmit disease germs, particularly typhus. Straw should be burned in the trenches and shelters, and all wood should be whitewashed.

Part IV

Construction of Shelters for Observation, Illumination and Communication

34. *Observation.* — The observation of the enemy is of first importance in position warfare. It should give complete knowledge of all the elements of the hostile line and prompt information of any movement of the enemy. It is effected by observation from the ground and observation by aircraft.

Observation from the ground is divided into three echelons:

a. Observation in front of the first line from small posts and listening posts.

b. Observation on the first line by sentinels and lookouts.

c. Observation in rear of the first line by artillery observers, sentinels, and lookouts of the shelters.

It is effected by the infantry and artillery.

35. *Observation in Front of the First Line.*—The small posts or listening posts of from 1 to 8 men are placed in rifleman's pits, shot holes, organized shell craters or in short semicircular elements of trench, connected with the first line by sap or low mine gallery. Their protection is assured by their invisibility. The retreat of the observers is protected:

a. By a system of branch galleries whose entrance into the main gallery can be rapidly closed.

b. By a barbed-wire protection placed over the sap.

The look-outs in small posts are placed in very short trenches, which are provided with loopholes. Protection at short range against grenades is secured by a network of wire.

36. *Observation on the First Line.*—This is effected by look-out posts organized preferably at the salients where the view is more extended. These posts give a view over the enemy's first line. They are provided with periscopes, with range finders, and large scale maps.

a. Simple hole in the parapet.—It will often be sufficient to pierce a circular opening in the parapet with a stick or to place a pipe in it.

b. Armored shelters and sentinel boxes.—These are provided by the engineer park and can be put into position without further preparation. The shelters have four sides and shelter

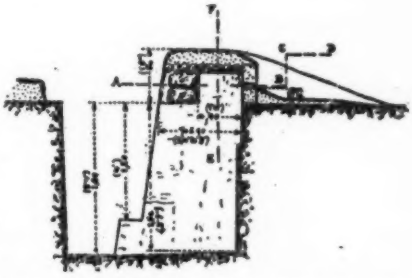


Fig. 71.—Observer's post of sheet steel and sand-bags.

only the head of the observer. The sentry boxes are cylinders large enough to shelter the entire body of the look-out. They are made of special steel, .47 inch thick, of reinforced concrete, or of double steel walls .12 inch thick with a

space of 4 inches filled with gravel or well-packed earth.

c. Shelter of sheet steel and sand-bags (Figs. 71, 72, and 72*a*).—The shelter is formed with a caisson of sheet steel. Two box-like receptacles on the front face are filled with gravel. The upper part is strengthened by a layer of logs and a covering of earth. The lateral part in rear is covered with sand-bags. The front face is bullet-proof; the side walls protect from oblique fire and the roof from the burst of projectiles. A similar shelter can be improvised from materials available if specially prepared steel sheets are not on hand.

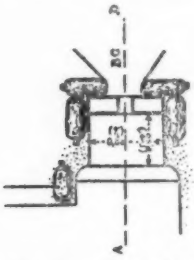


FIG. 72.—Plan through *A-B*.

d. Shelter of steel rails and sand-bags (Fig. 73).—An easy type to improvise is shown in Fig. 73. Two steel rails, 2 feet 8 inches in length, are placed horizontally a few inches apart, parallel to the trench. Upon these is constructed a roof to protect against the burst of projectiles. A frame protected by sand-bags covers the rear.

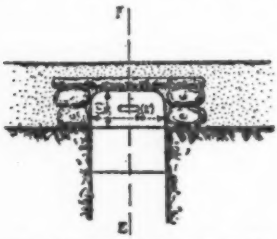


FIG. 72a.—Plan through *E-F*.

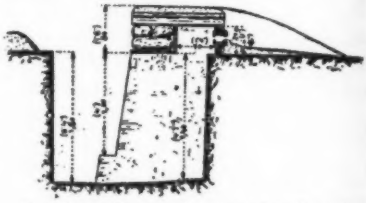


FIG. 73.—Observer's post of rails and sandbags.

e. Concealment of look-out posts.—It is necessary to conceal these posts by all possible means. Observation is carried out under good conditions only when it is done without the knowledge of the enemy. The posts should preferably be constructed on the right of a traverse, and in an excavation in front of the trench wall (Fig. 74).

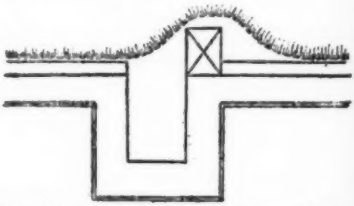


FIG. 74.—Location of an observer's post.

37. *Observation in Rear of the First Line.*—The observation posts, even of the infantry, are not necessarily in the first line trench or in the listening posts. Often, in the rear, points will be found which will give an excellent view and will not attract the enemy's attention. The term "observatory" is often employed for this kind of observation post.

The observatory generally has a more extended view than the look-out's post; it is protected and has means of communication such as telephone, helio-

graph, messengers, carrier pigeons, wireless. It may belong to the infantry, the artillery, or the higher commands. The observatory may be occupied by the commander himself or by an observer who represents him. In any case the observatory is near the command post. It is only useful so long as it can resist bombardment, therefore must have a low parapet, be defiladed from view, and proof against the large projectiles. A good form consists of a steel sentry box, sunk into a mass of concrete or placed at the end of a sap. They must be provided with large periscopes. Their construction must be made with the greatest care, the excavated earth removed to some distance, the position concealed, etc. It is a good idea to make false observatories, relatively visible, at some distance from the real ones.

38. *Coordination of Observing Stations.*—The location of the look-out posts and observatories must be determined in accordance with a complete plan for each center of resistance or sector of defense. No part of the hostile front should be free from observation, and the parts of the front favorable for the attack of the enemy should be specially watched. An observatory should be located near the combat posts of the commanders of the supporting points, centers of resistance and sectors. The observatories of centers of resistance and of sectors must have extended views over the whole of the terrain.

39. *Illumination of the Battlefield.*—In position warfare it is necessary:

a. To discover and keep in touch with the movements of the enemy during the night.

b. To seek out and illuminate hostile objectives so as to fire upon them.

c. To blind the enemy.

These results are obtained with searchlights. The smaller ones, about 12-inch, are acetylene, and have a short range. The larger, about 24-inch, are electric and have a longer range. They can also be used for signaling. They are placed in shelters, similar to those for machine guns, located so as to flank the line of fire (Figs. 75 and 76).

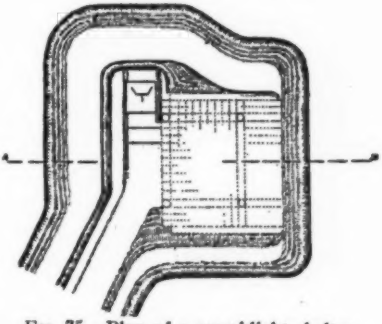


FIG. 75.—Plan of a searchlight shelter.

They can also be placed in rear of the first line on a platform with no overhead cover; but the personnel should be protected by a shelter close to the platform, from which the searchlight may be operated. The generating apparatus should be placed in rear under a strong shelter.

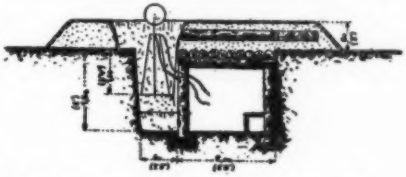


FIG. 76.—Searchlight shelter, cross-section *A-B*.

40. *Communication.*—During a bombardment communication becomes very difficult, but it must be maintained by all possible methods. This may be accomplished by:

a. Installing telephones under strong shelters.

b. Using lead covered cable, buried 6 feet deep, especially for the lines connecting the regimental, brigade, division and corps headquarters.

c. Placing rockets in all shelters and observatories where officers or noncommissioned officers are posted.

d. Preparing posts for visual signaling, safe from bombardment and defiladed from view of the enemy. These posts are constructed in shelters similar to those for searchlights and are provided with horizontal loopholes with the opening to the flank or rear.

Part V

Depots for Material, Ammunition and Arms; Emplacements and Shelters for Machine Guns and Trench Weapons

41. *Depots for Material and Ammunition.*—These consist of galleries of variable dimensions, opened in the walls of the trenches and approaches and usually lined with timber like mine casings. The entrance should be closed with a strong door. They are used to store water, rations, ammunition, grenades, pioneer tools, portable searchlights, field glasses, maps, range finders, periscopes, lighting pistols, rockets, etc. Depots for engineer material are usually installed in the angles of the approaches. Depots for water, rations, tools and sand-bags are usually established about 20 yards to the right of the company "command post" (par. 52). Depots for arms, ammunition, bombs, grenades, and rockets, about 20 yards to the left of the same post. An inventory of the material should be kept up to date at the company "command post."

42. *Principles of the Employment of Machine Guns.*

(1) The personnel and materiel should be protected from fire as much as possible.

(2) In order that they may be available at the moment of attack, it is indispensable that they survive the bombardment. Their protection must therefore be specially provided for, by employing all of the following means: (*a*) placing them under shelter; (*b*) making their emplacements invisible; (*c*) placing them in echelon.

(3) Casemates must be used only when they cannot be seen by the enemy, such as on the reverse slope, in woods, in villages, etc.

(4) The great importance of making the machine guns invisible necessitates the construction of firing emplacements outside the shelters, but close enough so that the guns can be put in action with the least possible delay.

(5) The firing emplacement may be protected by a light roof with very slight height, or it may be entirely without overhead protection. The emplacement may consist simply of a pit in the open field, situated in front or in rear of the parapet and connected with the shelter by an underground passage. The machine gun should be placed in action at the last moment; it may be simply placed on the edge of the pit without any protection, or preferably it should be covered by a light shield or a low parapet joining the natural slope of the ground with a gentle slope. The pit should be carefully hidden and will usually not be discovered by the enemy. Emplacements of this nature are frequently employed in rear of the first lines.

(6) When the trench is situated on the reserve slope, machine guns should be emplaced in concealed pits in front

of the trench and connected with it by underground passages.

(7) The requirements of invisibility make it necessary to conceal all the approaches to the firing emplacements by making them underground, and to increase the number of emplacements so that it will not be necessary to fire daily from those to be used in case of an attack.

(8) The emplacement of too many machine guns in the first line is dangerous; in order to stop an attack they should be echeloned to the rear. In favorable terrain, flank fire should be provided, to mow down the attacking lines as they push forward. Therefore the available machine guns should be distributed between the first line and the terrain in rear, with each emplacement prepared in a manner suitable to the terrain and object in view.

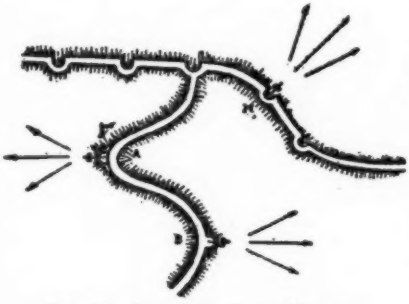


FIG. 77.—Location of machine-gun emplacements.

43. *Machine-gun Emplacements.*—An emplacement without overhead cover may consist of a simple platform constructed on the edge of the firing trench, where a flanking fire may be obtained; or on an approach where the terrain to the flank may be covered. The locations *M*, Fig. 77, on the first line, and *A* and *B*, on the approach, will give an effective flank fire in case of a hostile penetrating attack.

An emplacement with movable light head cover and low command is shown in Figs. 78, 79 and 80. The emplacement is made in front of the trench,

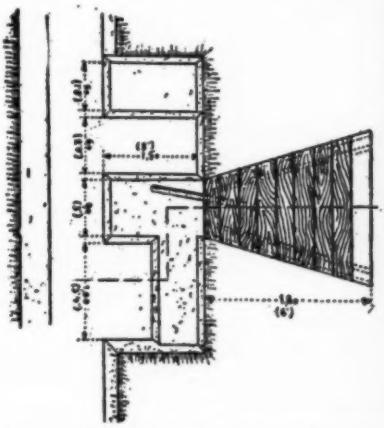


FIG. 78.—Plan of machine-gun emplacement with movable, light head cover.

with recesses and benches on each side for the personnel and ammunition. The head cover is hinged and is made of corrugated sheet iron, covered with earth, blending exactly in color and appearance with the front slope of the parapet. By raising the head cover with a lever, a loophole 3 feet by 1 foot is opened, which permits an effective fire.

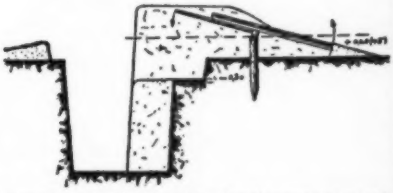


FIG. 79.—Profile showing head cover lowered.

44. *Shelters for Machine Guns.*—The bomb-proof shelters whose details of construction have been given constitute

a series of types from which choice may be made, depending upon the tactical requirements, the possibilities for defilade, and the materials available.

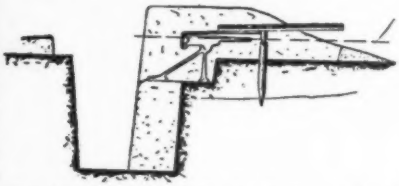


FIG. 80.—Profile showing head cover raised, machine gun ready to fire.

a. Shelter with revolving platform (Fig. 81).—The platform or support for the gun revolves on a circular base. The machine gun may be placed in action very quickly. The shelter is proof against only bullets and shell fragments. The roof is made of flagstones in two layers with corrugated iron between, supported by timber and covered with earth. The sides above the ground are closed with sand-bags and earth, and the emplacement is revetted with planks nailed to the posts.

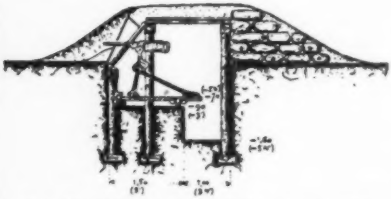


FIG. 81.—Shelter for machine gun with revolving platform.

b. Shelter of reinforced concrete steel rails (Figs. 82 and 83).—This gives much greater protection than that shown above. The roof is formed of a layer of steel rails over a layer of logs, supported by timber and firmly bound together with wire. Over the rails is a layer of earth 1 foot 4 inches thick. Protection from direct hits is secured by a shield of rails in which a loophole is arranged. The walls of the shelter should be revetted, and benches should

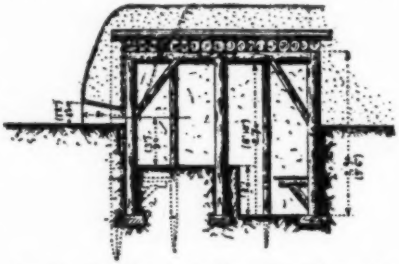


FIG. 82.—Profile of machine-gun shelter with overhead cover of steel rails.

be constructed for the personnel and ammunition. The roof should be made waterproof by covering the rails with

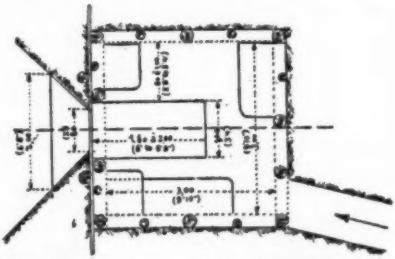


FIG. 83.—Plan of machine-gun shelter with overhead cover of steel rails.

tar paper. This shelter gives protection from shells of small caliber. It has considerable command (4 feet 8 inches)

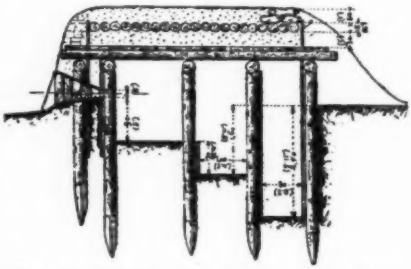


FIG. 84.—Machine-gun shelter with roof of earth and logs.

and therefore should be used only when it can be concealed.

c. Shelter with roof of earth and logs (Fig. 84).—This is similar to that described above, and has the same plan. It is proof against shells up to 6 inches. It has considerable command and

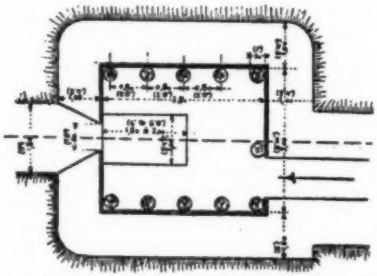


FIG. 85.—Plan of machine-gun shelter with roof of steel rails and concrete.

should therefore be used only where it can be concealed.

d. Shelter with roof of steel rails and concrete (Figs. 85 and 86).—The roof is constructed of two layers of steel rails separated by an 8-inch layer of concrete, and covered with earth and sacks of concrete, or of cement hard-

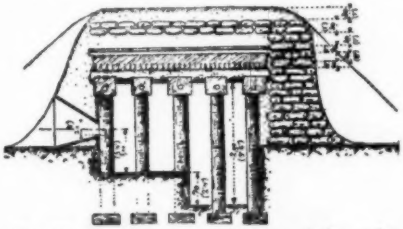


FIG. 86.—Profile of machine-gun shelter with roof of steel rails and concrete.

ened by wetting. When sacks of cement are used they should be bonded together by filling the spaces between them with loose cement moistened. This shelter is proof against the projectiles of large-caliber mortars.

e. Shelter of reinforced concrete (Figs. 87, 88 and 89).—This is used when it is necessary to construct a powerful flank defense in the first line and it is impossible to conceal it properly.

FIG. 87.—Location of reinforced concrete shelter for machine guns.

It is constructed entirely of reinforced concrete. The roof is constructed of two layers of steel rails separated by a layer of concrete and covered with con-

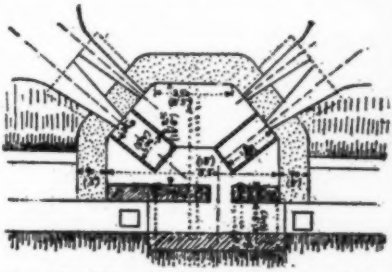


FIG. 88.—Plan of reinforced concrete shelter for machine guns.

crete reinforced with steel rods .3 to .4 inch in diameter. It will give protection from hits of the largest projectiles, and affords protection for the personnel

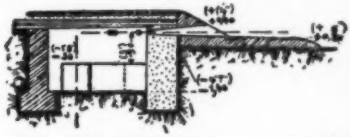


FIG. 89.—Profile of concrete shelter for machine guns.

of two machine guns. The command does not exceed 3 feet 4 inches.

45. *Emplacements for Machine Guns for Firing at Aircraft* (Figs. 90 and 91).—These emplacements should be

constructed in branches of the approaches or in rear of the front trench. Fig. 90 shows a machine gun mounted on post with a revolving block; Fig. 91, on a wheel with its axle fixed in a barrel filled with sand.

FIG. 90.—Emplacement for a machine gun mounted on a post for firing at aircraft.

46. *Emplacements and Shelters for Trench Weapons.*—In trench warfare, batteries of light mortars of the first line are generally situated between the front and the support trenches. Like machine-gun emplacements they are of

FIG. 91.—Emplacement for a machine gun mounted on a wheel.

two types, viz., with and without overhead cover. Whenever overhead cover is used, if practicable, alternative emplacements without it should be constructed nearby. The emplacements should be concealed as much as possible, and for this purpose the command should not be greater than that of the adjacent trench. The guns should be echeloned as indicated for machine guns.

47. *Emplacements for Trench Mortars, without Overhead Cover.*—Fig. 92 is a plan of an emplacement for two trench mortars. A battery of four to six mortars should be divided up into platoons of two mortars, by traverses. A lateral trench (Fig. 93) affords communication between the platoons and for the ammunition service; this trench branches off from the system of approaches. The mortars are placed on platforms 3 feet 8 inches square (Fig.

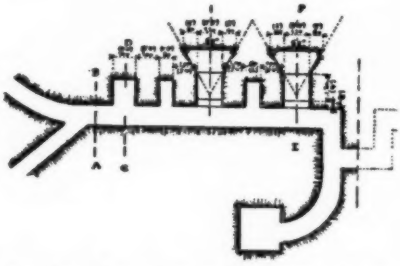


FIG. 92.—Plan of an emplacement for two trench mortars.

95), separated by traverses made of sand-bags or gabions 3 feet 4 inches thick to localize the effects of projectiles. Niches are constructed to one side of each platform to enable the gunners to fire the mortars under cover. Ammunition recesses (Fig. 94) are constructed

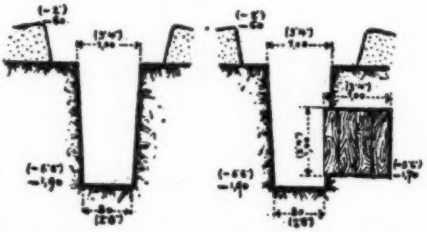


FIG. 93.—Section *C-D*, FIG. 94.—Section *A-B*, Ammunition recess, communicating trench.

near the mortar platforms to shelter a first reserve of supply. A protected observation post should be constructed between the platoons and in rear for the battery commander, in accordance with the principles given in Part IV.

48. *Emplacements with Overhead Cover* (Fig. 96).—The roofs should be constructed as for shelters for light field

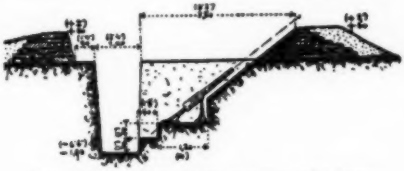


FIG. 95.—Section *E-F*, mortar platform.

fortifications. The type shown is formed of two layers of logs separated by a foot of earth and covered with sandbags and earth.

49. *Communication.*—A battery of light mortars is, like a machine-gun bat-

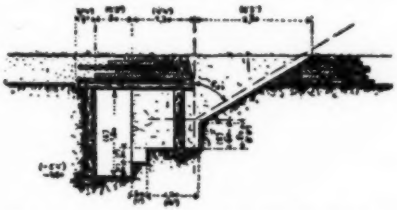


FIG. 96.—Emplacement for trench mortars with overhead cover.

tery, essentially a mobile unit, and should be constantly in communication with the infantry unit to which it is attached.

PART VI

IMPROVING LIVING CONDITIONS IN THE TRENCHES

50. *General Principles.*—Order and sanitary conditions must be rigidly exacted in the trenches, or they would soon become untenable or very unhealthy.

Command posts, telephone stations, first-aid stations, trench depots, kitchens, the supply of drinking water, latrines, and lavatories should generally be constructed in short, covered trenches at the angles in the approaches (Fig. 97).

For equipment, drinking water, rations, lanterns lighting sign-posts, etc., niches of various sizes are constructed in the parapet; or recesses, lined with timber, are constructed in the walls of the trenches and approaches.

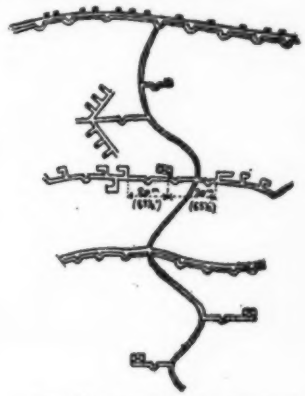


FIG. 97.—Location of command posts, telephone stations, kitchens, etc.

51. *Command Posts* (Figs. 98 and 99).—Besides their combat posts in the firing trench, the various commanders should be provided with shelters called "command posts." Their size and arrangements will depend upon the grade of the commander who occupies them. They should be large enough to accommodate the commander and his assistants or staff who must be constantly with him. They must be located so that they can easily be found, even by orderlies of another command; the routes to them must be plainly marked, and their position shown by flags and colored lanterns if this can be done without being visible to the enemy.

Figures 98 and 99 show a company command post. The captain has a room 8 by 10 feet, and his lieutenants a room

10 by 13 feet. A telephone and some tools are placed in the lieutenants' room. The furniture consists of cots, benches, stools, and a table. Ventilation is secured by two pipes which run at an inclination to the surface of the ground, or by vertical holes over the wall of the shelter. The shelter is heated with a stove or fireplace in a recess in the captain's room. The stove pipe should run the entire length of the shelter so as to utilize all the heat.

The company command posts must have on each flank:

a. 20 yards to the right, a depot of rations, tools and sand-bags.

b. 20 yards to the left, a waterproof shelter for arms, ammunition, grenades, rockets, etc.

They should be plainly marked C. P. No. —. All material should be always collected and inventoried in these fixed and known points, and nowhere else. In each command post there should be a bulletin board of uniform model to record orders, and matériel.

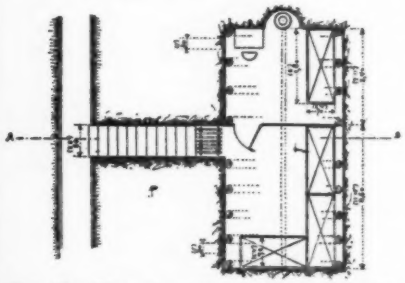


FIG. 98.—Plan of a company command post.

52. *First-aid Stations.*—These are connected with the fire trench by a communicating trench wide enough to carry a litter. They are constructed like other shelters. The walls are covered with straw mats or hurdle work, which must be changed frequently. They should be at least 8 by 12 feet in size. Two cots should be placed against one wall, and a bench for the wounded to sit on against the other.

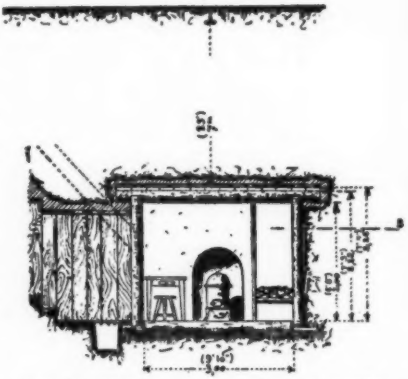


FIG. 99.—Company command post, section *A-B*.

53. *Kitchens.*—These should be constructed in shelters. The stove pipes should project somewhat above the top of the shelter to secure good draft. In addition, numerous ventilating holes must be made. They may be made large enough to accommodate the rolling kitchens. Small fires built of dry wood in the bottom of deep trenches do not betray the trenches.

54. *Latrines.*—It is absolutely necessary to construct latrines near the trenches and approaches. They may be without overhead cover as in Fig. 100, or with it as in Fig. 101. It is necessary to provide comfort and security. When practicable the place should be revetted with timber, and supports constructed. Cleanliness should be insisted upon, the deposits covered with earth daily, and the location changed when the pit is three-quarters full. The entrance trench should be paved with stones for at least 10 yards. The latrines should be ar-

ranged on the arc of a circle, five or six radiating from a central point, or in the form of a cross, or on both sides of

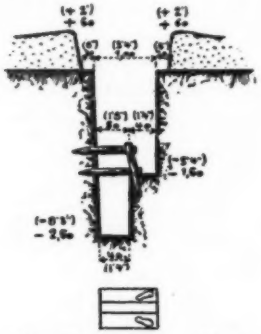


FIG. 100.—Latrine without overhead cover.

a special trench. The nearest latrines must be at least 30 yards from the principal approaches.

55. *Lavatories.*—These are improvised of tin or wood so as to form a

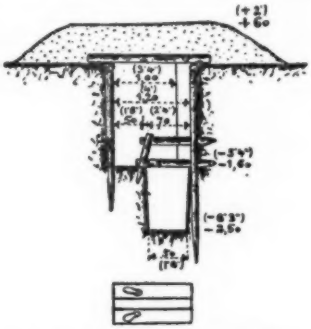


FIG. 101.—Latrine with overhead cover.

number of basins in a row, with holes in the bottom, placed above a wooden trough which receives and carries off the water to a cask or drainage pit. There should be a grating for the men to stand on. They should be constructed in a branch trench, covered if practicable. The floor of the trench should have a decided slope.

56. *Shower Baths.*—These should be installed in a deep shelter or in a cave shelter. A simple arrangement is to provide one or two kettles for heating water, tubs or casks for storing water, placed about 9 feet above the ceiling of the shelter. The tubs or casks should be connected with a pipe fitted with sprinklers, properly spaced. There should be a grating on the floor, and the bottom of the approach should have a fairly steep slope towards a drainage pit.

57. *Water Supply.*—This usually consists of several large casks filled with pipes if practicable, otherwise the water is carried to them. There should be an interval of at least ten paces between casks to avoid crowding and mud puddles.

CONCLUSION

58. The numerous works described herein would seem at first glance too complicated and massive to be ever constructed in actual warfare, but they are the results of actual experience in modern trench warfare, and numerous examples of them exist on the western front today. By means of work of this character the Germans have been able to hold the conquered portions of France with the minimum of men. Their bombproof shelters and the arrangements for the comfort and health of their men have especially occupied the thought of their highest commanders and engineers.

In many stances their captured underground works have been found intact in spite of bombardments by the heaviest artillery. Some of these shelters have been excavated to a depth greater than 40 feet, with galleries 150 yards long

and 7 feet high, completely lined with timber. On both sides of these galleries are large rooms, lined with timber, well ventilated by oblique shafts, and furnished with field cots with wire springs.

The timbering was so strong that in one case a 12-inch projectile which fell exactly over the top of the entrance did no damage except to crack a post. The exits are very numerous, and consist of six or seven stairways furnished with steel treads to avoid slipping, and several ramps with gentle slopes to permit of rapid exit in case of alarm. The shelters were heated with excellent stove- and lighted with electricity; the light and telephone wires ran along the walls, supported by glass insulators.

Billeting

From Authentic Sources

GENERAL PRINCIPLES

WHEN camping is for any reason impracticable, troops must resort to *bivouacking* or to being quartered in houses, barns, etc. The latter is termed *billeting*.

In so far as the comfort and health of men and animals are concerned, the worst *quarters* are generally better than the best *bivouacs*. The latter are resorted to only:

a. When troops are required to be in readiness for instant action.

b. When, for any reason, large masses are held concentrated.

c. When neither quarters nor tents are available.

Classes of quarters.—In the field, two classes of quarters are recognized: *ordinary quarters* and *close quarters*.

Ordinary quarters are occupied only at such distance from the enemy as admit of the comfort of troops and animals being the first consideration. There is no objection to a mingling of the different arms for the fuller utilization of stabling; and dispersion, either longitudinal or lateral, is limited only by considerations of the time and fatigue involved in such assembly as tactical considerations may require.

Close quarters are used when large bodies of troops are making long marches, when it is not desirable to fatigue the men by sending them long distances from the road, or when in close contact with the enemy. Every building is packed with as many men and animals as it will hold, and the remainder, for whom there is no room, bivouac in the immediate vicinity, but never in the streets. Tactical considerations govern. There should be no mingling of the different arms. If an engagement is imminent, the larger units should be distributed from front to rear in the order in which they will come into action, infantry occupying the more exposed positions, cavalry and other mounted troops the less exposed, and artillery, medical units, and trains always covered by other arms.

General rules.—The following rules must be observed in distributing troops:

a. Depots should be near good roads.

b. Dismounted troops should be nearest the water supply.

c. Staffs and hospitals have the first claim on quarters.

d. When quarters are limited, cavalry and other mounted troops have precedence over dismounted troops.

e. Hospitals should be given a quiet spot and the most sanitary position.

f. Staff and telegraph offices should adjoin, if possible, and should be clearly marked.

g. Officers must be close to their men, and units kept together as far as practicable.

h. When a column is halted for the night only, the troops composing it should not be quartered more than a mile or two from the next day's line of march.

Allotment of quarters.—The chief of staff allots *billeting areas* to corps and divisions. Division chiefs of staff allot areas to brigades and smaller

units, and the quartering of troops within the allotted areas is supervised by staff officers assigned to that duty. The senior staff officer within each area so assigned will, if practicable, issue requisitions for the necessary quarters in the name of the superior commander, describing the area within which quarters are to be furnished and stating the numbers of officers, enlisted men, and animals to be quartered. The requisition will also state whether food and forage will or will not be provided. The number of days for which quarters will be required will be stated only by specific order of the superior commander.

In estimating the capacity of areas for the quartering of troops in default of more accurate information, the following rules will serve as an approximation:

a. For one week a given area will house and feed a force equal to twice the population.

b. Quarters without subsistence may be estimated at about ten men per inhabitant in rich farming country, and at the rate of five or six per inhabitant in towns and villages.

Billeting parties.—The regimental billeting party serves as a type of those of other units, should others be desirable. It is ordinarily composed of one regimental staff officer and one noncommissioned officer of the regimental noncommissioned staff, with two enlisted men from each company. The officer should be provided with the requisition described in paragraph 4, and with information as to the locality and extent of accommodations. On arrival at the prescribed locality, he will proceed direct to the proper official (mayor, president, chief of police, owner, etc.) and present to him the requisition for quarters. He will also inform this person of the time troops will arrive, of any special rules that the inhabitants will be required to observe, and will ask information as to the existence of any infectious diseases, the character of the water supply, special precautions advisable to prevent fire, etc.

If time permit, the local authority will prepare an order for presentation by the billeting party to each inhabitant on whom men and horses are to be quartered. This order should state the number of officers, men, and horses to be accommodated by the inhabitant, and whether food and forage are or are not to be provided by him.

On receipt of the mayor's orders, the officer will distribute them in proper proportion to the representative of each company and will give him any necessary instructions regarding the posting of warnings on infested buildings, arrangements for watering, special guards necessary, the location of headquarters, and the place and time of assembly when the quarters have been inspected. The men of the company party will then proceed to the houses and stables allotted to their organization, to the occupant of each of which they will present their order and proceed to inspect each building, marking clearly with chalk on the door of each the names of officers and number of men or animals it is to accommodate, together with the command (commanding officer and regiment) to which they belong. *These marks will be erased before vacating the quarters.*

In the meantime, the officer will select and mark the position of the regimental headquarters, guard room, stables for headquarters, animals, etc.; and select the locality for gun and train packs. He will ascertain the most suitable lines for communicating with

neighboring units, and will, if practicable, prepare for the information of the regimental commander a sketch showing the assignment of the various units and giving details regarding roads and communications. On reassembling his men, he will point out the locations to them and direct them to convey the information to their organizations and guide them to their quarters.

When time is not available for the above procedure, the troops will be halted outside their assigned areas. A party from each brigade area will present to the mayor or other official a requisition for quarters, and request his cooperation in the allotment of the same. He will take steps to notify the inhabitants as to what is required. At the same time the billeting party will roughly allot the accommodations, areas being assigned to the larger units, and these in turn allotting certain streets or houses to their units.

In allotting quarters, the following points, in addition to those noted in paragraph 4, should be observed:

a. Regard should be paid both to the comfort of the men and the interest of the inhabitants.

b. Staff officers should be on main communications, and easily found.

c. Mounted men should be near their horses, guns, and wagons.

d. Both sides of a street should be allotted to the same unit.

e. Roads and communications must never be blocked.

General rules in quarters.—a. At irregular intervals officers will visit the quarters of their men and the stables of their horses, at least once during each day and once each night.

b. If necessary, the inhabitants should be disarmed and allowed to leave their quarters only during prescribed hours, the streets being patrolled to insure obedience to this order. When out after dark, they should be required to carry lights.

c. From the moment the advanced billeting parties enter a town, village, or farm, precautions must be taken to prevent the inhabitants conveying information to the enemy. Telephones and telegraph must be seized.

d. All ranks must be cautioned against talking on military matters in the presence of the inhabitants, against leaving letters or papers about, and on the importance of taking every precaution against any leakage of information.

e. All houses where liquor is obtainable must be placed under control. In every house occupied by troops at least one man must be constantly on guard over the arms, which must never be left stacked outside. As a precaution, both against fire and possible signaling to the enemy, directions should be issued controlling the use of fire and lights, both by the inhabitants and the troops.

f. When the enemy is within striking distance, the villages in the front line should be prepared for defense against surprise and a portion of the troops in them kept in constant readiness, so that the defenses may be rapidly occupied.

g. An *alarm signal* and places of assembly should be arranged for use in event of troops being required to turn out suddenly and, if quarters are to be occupied for several days, troops should be exercised in so turning out and taking up their proper positions. This exercise is especially important at night.

h. In certain cases, as in sieges, it may be necessary to remove the inhabitants and accommodate them outside the immediate zone of operations.

Varied Ground

Musketry Training

In musketry training in the past, the Army has attached great importance to range practice with service ammunition and comparatively little to gallery practice. It is obvious that with the organization of the large forces which the Government will raise, gallery practice must increase in importance if we are to maintain the high standard of marksmanship which the Army has reached.

In the past the expenditure of service ammunition has been large and costly. In the future its use for instruction will have to be curtailed and the supply conserved for battle purposes. Again, considering the needs of a million men, the number of available ranges is few.

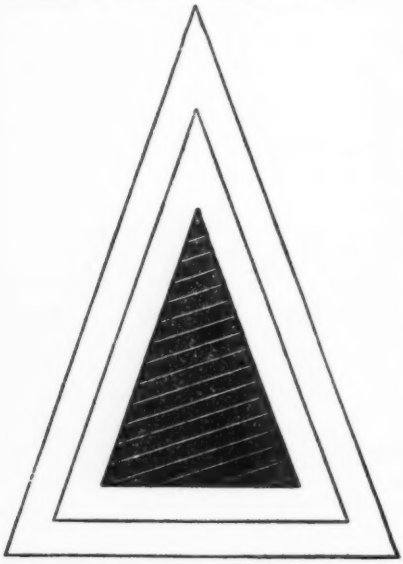


FIG. 1.—Elementary target No. 1.

For these reasons, and because the time which any one regiment will have for practice on the range will be very short, the standard of musketry will suffer very materially if too much reliance is placed on this phase of training. Under the circumstances, the soldier must master the technique of shooting before he is taken on the range for experience with service ammunition.

FIG. 2.—Elementary target No. 2.

This mastery can be attained with the gallery rifle, on gallery ranges, convenient to mobilization camps and removed from the restriction of endangering the lives of the surrounding populace. It can be attained at surprisingly little expense, and, if the practice be conducted with thoroughness and care, the degree of proficiency obtained will be such as to require the minimum practice with service ammunition.

Paragraph 75, Small Arms Firing Regulations, 1913, contemplates additional gallery practice. The amount and details of this practice are left to the discretion of the company commander.

The British Army has adopted a course of gallery practice, to be fired by all Cavalry, Yeomanry, Infantry and Royal Engineer units, before they are

taken to the rifle range to fire ball cartridges.

The course is as follows (see table on following page):

GENERAL INSTRUCTION

1. Parts 1 and 2 will be carried out under the personal supervision of an officer who will be present during the whole of the firing. This officer will insure that all conditions are strictly observed and that the aiming is accurate.

2. Men should not be allowed to fire Part 2 until they have qualified in Part 1.

3. In grouping practices, one firer will be detailed to each party. He will fire five shots, maintaining the same point of aim and sighting throughout.

FIG. 3.—Instructional target No. 1. Upright figure. 25 yards = 400.

The group of shots will be measured with wire rings of 1-inch, 2-inch, and 3-inch diameter. The ring containing all the shots will be recorded as the measure of the group; or, if only four of the shots are included with the ring, the group will be recorded as measuring 3 inches, with one wide shot.

FIG. 4.—Instructional target No. 2. Upright figure. 25 yards = 500.

4. If a jam occurs during a rapid practice, any rounds already fired will be disregarded and the series will be repeated. Four points will be deducted from the score for every round fired after the command "Cease firing," given at the expiration of the time allowed for the series.

5. It is not advisable to fire more than two practices in one day.

6. Whenever possible, marking should be done from the firing point by means of field glasses. The inspector should indicate, by means of a pencil, as well as by verbal description, to the firers, on a target similar to that being fired at, the exact position of the shot hole.

7. The course may be repeated if time and ammunition are available, the conditions being made progressively more difficult as found desirable.

SPECIAL INSTRUCTION, PART 2.

1. In snap shooting practices the targets will be operated by a marker who will act under the direction of the superintending officer. The marker will time the exposures and is to be screened from the firer in such a way that he cannot be seen by them.

FIG. 5.—Instructional target No. 3. Lying figure. 25 yards = 300.

The rifle will be loaded before the target appears. The butt of the rifle will be in contact with the ground until the target appears.

2. All practices will be fired from the prone position.

"Grouping practice" consists in firing a series of shots usually fired at a distinct and fixed aiming mark without any change of sighting or of aiming point. The object of grouping practice is to teach soldiers to shoot readily and consistently at the very beginning of their training in rifle shooting. When they are able to fire so that their shots are grouped closely together, their training will be advanced to the next stage.

"Application practice."—When a man has acquired sufficient skill in aiming and sighting practice to make a good group with certainty, he will be allowed to begin application practice. This teaches the firers to adjust the sight and point of aim so as apply his group to an aiming mark.

"Snap shooting" means firing an effective shot in the shortest possible time and necessitates (*a*) watching the front; (*b*) quickness of aim; (*c*) observation of the flight of the bullet,

MINIATURE RIFLE COURSE (BRITISH)

Distance 25 yards, 5 rounds in each series

PART I

No.	Practice	Target	Instructions for conduct of practice	Standard
1	Grouping.....	First class elementary...	Lying, with wrist or rifle rested	3-inch group.
2	Grouping.....	First class elementary...	Lying.....	3-inch group.
3	Application.....	First class figure.....	Same as 1.....	5 shots on target
4	Application.....	First class figure.....	Lying.....	Score 12.

Any practice in which the standard is not reached should be repeated.

PART II

1	Grouping.....	Second class elementary.	Lying.....	3-inch group.
*2	Application.....	Second class figure.....	Lying.....	Score 12.
3	Snap shooting.....	Figure 3.....	Lying, rifle rested, target exposed 6 seconds	3 hits.
†4	Rapid fire.....	First class figure	Lying, 35 seconds allowed	5 shots on target.
5	Snap shooting.....	Figure 3.....	Lying, 4 seconds allowed	3 hits.

*Standing from trench. †Used magazine.

when possible; and (*d*) loading immediately after firing.

"Rapid fire" means firing as many rounds as possible with reasonable accuracy in a given time.

By using landscape targets on a gallery range, the subject of fire disposition can be effectively taught to a squad.

The details of the construction of a range are not given, as it is thought to be unnecessary.

A similar course of practice on such a range was followed with great success at the Disciplinary Barracks at Fort Leavenworth, Kans.

Class Standing as an Index of Worth

The tone of Captain Steese's article does not invalidate the truth of his main contention. The honor men are the ablest men. It does not follow, however, that they have the monopoly of initiative, industry and perseverance, nor that their less fortunate fellows are stupid. Those who survive the ordeal, even as last man, are not lacking in certain qualities, solid if not brilliant; and many who fail to graduate achieve substantial success in life, including the grade of general officer. It cannot be said that a goat ever slipped through West Point unless a desperate climb be called slipping. I know several men who might be said to have slipped through; they were divinely endowed with intellect and indolence, and they slid into the engineers.

The honor men are too valuable to be wasted in disbursing the rivers and harbors appropriation or in digging canals. They are too valuable to be used even as engineers. The Army should get its engineers from enginering schools, as it gets its surgeons from medical schools. The brightest men should be kept in the line.

The vital deduction from Captain Steese's article is this: West Point, as now constituted, has outlived its usefulness. West Point must reform. A revolution is due. The old fetiches of engineering and hazing and the recent one of sport must go. There must be less exact science and more strategy, less yearling-corporal puerility and more manliness, less athletics and more tactics, less social functioning and more military history. We have today thousands of capable officers who are non-graduates. If West Point is to maintain its place as the fountainhead of the military profession, it must mend its ways, abandon the outworn, and adjust itself to contemporary conditions.

HOLLIS CHENERY CLARK,
Captain, United States Army.

Why Is It?

I have just concluded my duties as a member of an examining board. Several first lieutenants of cavalry appeared before the board. They had had, some of them, eight years of service as officers, some of them nine years, one of them ten years. They were excellent officers. The members of the board knew them intimately; each member knew them all to be men of fine character, excellent principles and habits, efficient officers as far as past requirements had demanded results of them. There was nothing that could happen in the course of the examination, except the physical tests, that could have convinced the members of this board that these officers should not become captains. To the board they were already captains, and it was merely complying with the law in examining them. It was only a form, this examination; the men had already, by their performances of the preceding

years, demonstrated their fitness for promotion.

This formal examination, conducted, as I have said, merely to save the face of the board, to enable its members to sign the required certificates, proceeded as carefully as if we did not already know the future value to the service of these officers. Examination papers were prepared that fulfilled all the requirements of the general orders bearing on the subject. The written and oral examinations brought prompt and accurate answers to our questions. In the practical tests in Drill Regulations, Small Arms Firing Regulations, Field Fortifications, Hippology, Military Topography, and Packing, a sufficient knowledge of the technique of the various subjects was unmistakably apparent. But the results of the practical examination in Minor Tactics came as a bewildering disappointment.

The officers being examined showed no training in leadership; their estimates of the situations were insufficient and inaccurate; their tendency, instead of commanding the men of the troop assigned them with which to solve their problems, instead of giving orders to their platoon leaders when a situation requiring action was announced them, assumed a far-away look, as if they were searching their memory for precedents, and answered as if they were reciting a lesson in abstract theories: "I would do so and so;" "I would give such and such orders;" "I would send such and such a message."

A few months ago I was directed to conduct the field firing of the machine-gun companies of several different regiments. Before the companies assembled the captains were informed that this was *their* opportunity, that I would conduct the firing, but that the daily programs were to be their own. I made this single stipulation in my instructions to them:

This I shall insist on: at the conferences incident to the practice no adverse criticism of the automatic machine rifle, cal. .30, model of 1909, will be permitted. Little as I know of this arm, I know enough of its defects and limitations, and so do you. What we want to do at this practice is to find out what expert men can do with it, not what they cannot do. Bear this in mind, and come here prepared to show how well you can do with your rifles, in spite of their defects.

When the companies assembled, I divided them into three groups; the officers of each group formed a committee; each day's firing was in charge of one of these committees. They were informed that they would be in full charge; that I would discuss results with them after the firing, but that the means by which those results were to be obtained were left entirely to them; that "the bridle was off;" that they need have no fear of being found fault with if the results were not satisfactory.

It took a long time to convince those officers that their plans could actually be carried out without being first examined by some one and approved. After I had repeatedly refused to have anything to do with their daily programs before they carried them into execution, I realized that their habit of dependence on approval precedent to any action was a fixed one, and one day when they were all assembled I asked them: "Why is it that you don't go ahead when you want to do something, without asking if it is all right to do it?" One of the officers, a lieutenant, and an officer generally recognized throughout the service as an ex-

pert on the mechanical employment of machine guns, replied: "Why, Colonel, all my service I've been jumped so hard if anything that I attempted to do without authority went wrong, that I have learned that the safest way is to do only what I know beforehand will be approved." And the others chimed in: "Same here!"

I find, by searching the Army Register, that the first lieutenants referred to above have, one or more of them, at some time served in the 3d, 6th, 8th, 9th, 10th, 11th, 13th, and 15th Cavalry. The officers of the machine-gun companies have similarly served in the 7th, 8th, 9th, 10th, 13th and 15th Cavalry, and in the 4th, 7th, 8th, 11th, 13th, 14th, 20th, 21st, 23d, 24th, 25th, 26th, and 30th Infantry. All these officers entered the service during the Spanish War, or since then.

This, then, is the condition indicated: several lieutenants of cavalry, averaging nine years' service as officers, who have served in eight different regiments, are practically untrained in leadership. They are thoroughly trained in administrative duties; they are expert horsemen; routine duties in camp or garrison have no secrets from them; they exhibit a sufficient knowledge of military law, and, theoretically, of the Field Service Regulations. They can apply the Drill Regulations on the drill field; they do not know how to fight.

At the conclusion of the examination I said to a group of them: "Gentlemen, you impress me as being like a dentist who knows how to rent his office, employ a secretary, purchase his supplies, keep his office in a sanitary condition, but who cannot fill teeth."

In the case of the officers of the machine-gun companies, here was a group of thirteen officers, who had served in twenty different regiments, whose service covered varying periods up to eighteen years, and whose initiative was, by their training in those regiments, completely destroyed.

And I wish to add that these were good officers, as we reckon officers in our Army, all of them; there was not a drone or a dullard among them. I think that they represent the line of the Army very fairly: do they furnish a sufficient sample to lead to the inference that the officers of the Army, of their grades and length of service, are as they are, *untrained to leadership, and without initiative?*

Why is it?

Do you remember, when we served together years ago, the absolute loyalty we all felt towards the Old Man? Since I lost him as my commanding officer, I have compared him and his methods, and the results he obtained, with the personality and methods and results accomplished by those I had before him and those I have had since, and I have almost come to the conclusion that we were all so loyal to him because he was loyal to us; that our initiative developed under him because he had complete confidence in us and let us know it unmistakably.

Believing this, a practical formula for leadership suggests itself to me: *Loyalty alone induces loyalty; initiative is developed by confidence, and successful leadership depends on initiative, confidence, and loyalty.*

My answer to the question asked in the accompanying paper is that too many of our commanding officers in the past have not had confidence in their subordinates and let them know it; as a result loyalty wavered, initiative died.

Utility vs. Style

A few years ago it was the custom to change details of the uniform and adopt something "new" with every change in the administrative heads of the War Department. We all know to what expense we were constantly being put by these ever-recurring changes, and the INFANTRY JOURNAL frequently had occasion to protest against these frequent changes, even if something were necessarily sacrificed in the way of improvement in the uniform.

One of our Civil War generals, whose bronze statue now "adorns" a prominent circle in Washington, is quoted as saying that "the fate of a battle may depend on a buckle or a linch-pin," and a number of experienced officers of the regular service are now very much exercised over the question of going to war with the present form of very unpractical service coat or blouse.

It is claimed by the fighting men who have to wear the coat—and they are the ones who ought to know and be consulted—that, like many of our peace institutions, it is in no sense a fighting garment, and will, in fact, prove a handicap.

The coat looks well on parade and is all right for the garrison, the street, or the recruiting office, because it fits snugly, buttons nattily around the throat, and is usually worn at such times over a boiled shirt.

But when our soldiers take the field and necessarily don the ever-essential olive drab shirt, they prefer to discard the blouse and do their fighting untrammeled by its close-fitting contour. The fighting men are almost a unit in declaring that the present coat is disagreeably binding about the chest, chokes the wearer about the neck—especially over the field shirt—and is about as unpractical a garment for fighting garb as could have been devised. A college athlete would have a case of the horrors if he had to wear it in outdoor contests, and nowadays soldiers must be athletes to win out in war.

Officers of our General Staff are said to have been very favorably impressed with the practical utility of the service coat worn by the military members of the British mission to the United States, a loose-fitting, roomy, comfortable coat, with wide rolling collar and big pockets, such a coat as a hunter would select for an all-day tramp on a December day, or for sitting in a duck-blind during a storm of snow and sleet.

It is said that the War Department, possibly considering the question as merely academic, has so far turned a deaf ear to the many suggestions from the combatant arms for a sensible fighting coat after the British model, even though officers have offered to make the necessary alterations at their own expense. But the question will not down, and it is to be hoped that the common-sense alterations required to make the coat practical for use in the trenches, on the march, for bayonet work, and bomb throwing will be authorized before the fighting men of our first expeditionary force land in Europe. It would be almost criminal to handicap the soldier with a coat which does not permit the best use of his muscular strength.

The breeches are too tight around the knee and calf of the leg, and thus reduce the marching comfort and ability of the infantry. The French and German infantrymen are probably the best marching soldiers on earth, and we may well follow them in the adoption

of loose trousers and leggings for infantry. A service coat with open collar of the pattern now used by British officers seems to be most suitable. We also urge the adoption of a light-weight khaki-colored shirt for wear under the coat in warm weather.

As thus uniformed, with the addition of a neat black tie for wear when leaving camp or post, or when otherwise prescribed, our soldiers would present a neat, soldierly appearance. They do not do so now when attired in field uniform. Every officer and enlisted man would gladly stand the small expense necessary for changing the coats now on hand, and future contracts should be of the new pattern. We are firmly convinced that a referendum on the subject would be carried with but few dissenting votes.

INFANTRY AND CAVALRY.

Editorial Department

Exigencies of the Service

That old shibboleth, "the exigencies of the service," has been whispered in the office of the INFANTRY JOURNAL, and just as we were lulling ourselves into a false sense of security the War Department found immediate and pressing need for the officer who has so ably edited the JOURNAL for the past six months. Always he has given time to this work that would normally have been devoted to golf, tennis, polo, or whatever other outdoor exercise most appealed to his particular bent. Now he is devoting twenty-four hours a day to his military duties, where formerly he had ten or twelve for sleep and the joys and sorrows of the editorial desk. He has gone to more congenial tasks, and has left to other and less qualified hands the duty of seeing that the INFANTRY JOURNAL appears regularly. Bear with us, then, and if you find our shortcomings more numerous than you should like, charge them to the head and not to the heart—to "the exigencies of the service."

"On to France!"

The wish expressed by Marshal Joffre that American troops be sent to France meets with the desire of all patriotic Americans, and there can be no doubt but that troops will be sent as rapidly as they can be properly organized and equipped and transportation be provided.

In this connection, the uninformed public does not realize that, in the expanded Militia and Regular Army which must be more than doubled and raised to war strength, more than 80 per cent will be raw recruits and probably half of the officers will have been drawn from civil life, with but little or no training. Of the new army of 500,000 men to be raised, none of them will have had any training, and they will probably not be in training camps much before August 1.

To assist in their training probably one-half of the present experienced officers and soldiers of the Regular army must be used.

This popular cry of "On to France" is an echo of "On to Richmond" heard during the Civil War.

General Upton, speaking of the Battle of Bull Run, says:

> Mistaking numbers for strength, and forgetting, too, that the fame of the Militia at Bunker Hill and New Orleans was acquired behind formidable entrenchments, Congress and the Cabinet, the press and the people, united in demanding that before their discharge the 75,000 men should be led into battle.
>
> The disaster that ensued demands that the causes leading to it be carefully considered. First among them was the popular but mistaken belief that because our citizens individually possess courage, fortitude and self-reliance, they must necessarily possess the same qualities when aggregated as soldiers. And next to this error was the fatal delusion that an army animated by patriotism needed neither instruction nor discipline to prepare it for battle.

On the Infantry must fall the brunt of the work and fighting, and our present faulty organization must be changed to conform to that now used in France.

Each company must be increased to at least 200 men and be equipped with light machine guns, hand grenades and rifle grenades, and taught to at least handle them. They must also be furnished with steel helmets and gas masks. Each battalion should have a heavy machine-gun company and a section with rapid-fire guns (37 mm.).

The Field Artillery is not equipped with trench or heavy guns, nor trained in their use. Owing to shortage of transportation and but little likelihood of its being used mounted, our Cavalry will probably be held back for later transportation, if sent at all. To be of use in France they should be trained and equipped as infantry. They will probably be kept on the Mexican border.

Whatever sentimental reasons there may be, they should not outweigh the more weighty military ones. We must not send divisions into France until they are equipped and nearly trained according to present requirements so that they will be a credit to the United States and be capable of reasonably early use on the firing line.

Φ

Universal Service

There seems to be prevalent a belief that in passing the bill for selective draft the Congress has instituted a novel feature in our system of government. Quite the contrary is true. One of the first legislative acts after the adoption of the Constitution was the so-called Militia Act of 1792, which provided that the Militia of the United States should consist of all able-bodied citizens between the ages of 18 and 45. The Act went even further than today, because each soldier was required to provide himself "with a good musket or firelock, a sufficient bayonet and belt, two spare flints and a knapsack, shot pouch and powder horn, twenty balls suited to the bore of his rifle, and a quarter of a pound of powder." Furthermore, officers had to provide themselves with a sword or hanger and espontoon." Now, the term "Militia" comes from the French *milice,* which in turn comes from the Latin *militia* or *miles,* meaning a soldier; and it was clearly in this sense that the first Congress used the term "Militia," and not in the present-day understanding of a body of partially trained citizens as distinguished from a regularly and fully trained army. It was never supposed in those early days that the whole power of the nation would be called into service, or that all men between the limiting ages would be needed to form an army. But the wise and democratic thing was done, and liability to service was made universal, in the sense that it included all males of certain ages. That there would be exceptions was, of course, understood and accepted, but basically there is no difference between the principles of the militia act of the second Congress and the selective draft of the present Congress.

We could, however, wish for a happier term than "draft," which always savors of force; or the more obnoxious term used by the press of "conscription," which carries the meaning a shade further into the realms of unwilling service. "Universal service" seems so much the better term—the right and privilege of serving one's country, a repayment in some slight measure for all the blessings and privileges one has enjoyed through the long years of peace.

Further, the words do not necessarily mean service on the battle line, or even

in the armed forces of the country. True universal service means service by all—men, women and children; services such as the French people have given and are giving in these days, when nations and not armies alone carry on the conflict; service, universal service, each in his own field, each in the place where he or she can best aid the country as a whole. Not, of course, leaving to the individual selection of the task he most likes or desires, but service directed and selected by a central body, well qualified, if not best qualified, to assign to each the part he can best take, the function he can best perform—true universal service.

Does not U. S. stand for universal service?

Philosophy

It has been said that the soldier in war time becomes a good deal of a fatalist. Through all the sanguinary days on the European battle line the Frenchman has kept his sense of humor. The Poilu's Litany, which is quoted below, has been published before, but is worth reprinting:

Of two things one is certain—either you're mobilized or you're not mobilized.

If you're not mobilized there is no need to worry; if you are mobilized, of two things one is certain—either you're behind the lines or you're on the front.

If you're behind the lines there is no need to worry; if you're on the front, of two things one is certain—either you're resting in a safe place or you're exposed to danger.

If you're resting in a safe place there is no need to worry; if you're exposed to danger, of two things one is certain—either you're wounded or you're not wounded.

If you're not wounded there is no need to worry; if you are wounded, of two things one is certain—either you're wounded seriously or you're wounded slightly.

If you're wounded slightly there is no need to worry; if you're wounded seriously, of two things one is certain—either you recover or you die.

If you recover there is no need to worry; if you die you can't worry.

Greetings

We extend the glad hand of welcome to our latest contemporary, the *Official Bulletin*, a daily periodical and the organ of the Committee on Public Information, recently organized by the President. The issues so far published have been largely made up of a compilation of special orders of the War Department and such other items as the daily newspapers and service journals have been wont to use as "fillers" for their columns. The subscription price is $5.00 a year, but, fortunately, copies are distributed free to newspapers, public officials, and others. The *Official Bulletin* may some day fill a useful rôle. So here's more power to the scissors and paste pot.

Night Operations

A Department devoted to the interest of newly commissioned Infantry officers, officers of the Infantry Officers' Reserve Corps and candidates for commission.

Conducted by Capt. W. H. Waldron, 29th Infantry

MARCHES AND CONVOYS

Q. Define a successful march?

A. A successful march, whether in peace or war, is one that places the troops at their destination at the proper moment and in the best possible condition. (96)

Q. Upon what does the success of a march depend?

A. Upon the skill with which it is conducted, careful preparation, strict discipline, and the observance of march sanitation. (96)

Q. What are the general principles governing the conduct of marches?

A. 1. While conforming to other requirements, marches are conducted so as to reduce to a minimum the hardships on the troops.

2. When possible ample notice is given so that preparations may be made without haste.

3. The march is habitually in route order.

4. Troops are informed of the length of halts, so that they can take full advantage of the same.

5. The men are not kept under arms longer than is necessary, nor required to carry heavy burdens when transportation is available.

6. Special care is paid to the feet of the men and the hoofs and backs of animals.

7. In prolonged marches at least one day in seven should be a day of rest.

8. A forced march is never undertaken unless the situation requires it. (96)

Q. What compliments are paid by troops on the march?

A. As a rule, troops on the march pay no compliments; individuals salute when they address, or are addressed, by a superior officer. (96)

Q. What preparations for a march devolve upon the commander of a force?

A. 1. That the men and animals are in fit condition, and that they are properly equipped.

2. That all trains accompanying the command are loaded as prescribed.

3. That proper measures have been made for the replenishment of supplies.

4. That necessary arrangements have been made for the care and evacuation of the sick and wounded. (97)

Q. When units are camped some distance apart, how is the march column formed?

A. The column is formed by the successive arrival of the fractions at an initial or starting point which, as a rule, is located in the direction of the proposed march. The commander fixes the initial point after considering the position of the troops and the location of the roads by which they can join the column. He prescribes the hour by which the leading fraction clears the initial point, and, if necessary, the routes to be followed in reaching it. To prevent needless marching, he may designate special initial points for various units of the command. (98)

Q. What road space is occupied by the troops of the several arms?

A. 1. Foot troops in column of squads, two men per yard.

2. Cavalry in column of fours, one man per yard.

3. Guns, caissons or wagons, 20 yards.

4. Auto trucks, 12 yards. (This is believed to be too little distance.—Ed.)

Q. What factors govern the distribution of troops in a column on the march?

A. 1. Tactical considerations, which in the presence of the enemy are paramount.

2. By the rule requiring the hardships of troops to be reduced to a minimum. (99)

Q. What rule is followed in designating the troops to lead in the column of march?

A. The order of brigades in divisions, regiments in brigades, battalions or squadrons in regiments, and company units in battalions and squadrons is generally changed from day to day—the leading unit one day taking its place at the rear on the following day. (99)

Q. What rules are prescribed for troops marching on roads?

A. 1. They keep to the right of the road, leaving the left free.
2. When roads are narrow, space should be left for messengers to pass freely up and down the column.
3. When roads are soft with mud or heavy with sand or very dusty, it may be advisable to divide the column longitudinally, thus permitting the men and animals to pick their way, leaving the middle of the road clear.
4. Straggling and undue lengthening of the column are not permitted. (99)

Q. What is the formation of the route column for the various arms of the service?

A. 1. Infantry, column of squads, or column of twos when necessary.
2. Cavalry, column of fours on good roads or when a compact formation is necessary, otherwise in column of twos.
3. Artillery, section column, or in double section column if the width of the road permits. (99)

Q. What rules govern the time for starting a march?

A. 1. As a rule, foot troops do not start before broad daylight.
2. Mounted troops, when practicable, do not start until an hour after broad daylight. (NOTE: Tactical considerations are always paramount.) (100)

Q. What factors affect the rate of march of troops?

A. 1. The length of the march to be made.
2. The size of the command.
3. The condition of the troops.
4. The condition of the roads. (Sandy, rough, muddy and slippery roads reduce the rate of march.)
5. The state of the weather. (Great heat, strong head winds and storms reduce toe rate.)
6. The topography of the country. If hills are to be climbed or swampy country is to be crossed, or defiles passed, liberal allowances must be made in time calculations. (101)

Q. Under the varying conditions of service, what are the rates of march for infantry?

A. 1. For drill it is 100 yards per minute or 3.4 miles per hour.
2. On the road, the maximum to be counted upon is 88 yards per minute, or 3 miles per hour; including halts, 2½ to 2¾ miles per hour.
3. Under ordinary conditions, the rate of infantry columns may be taken at 2¼ to 2½ miles per hour.
4. For small bodies, the average day's march is 15 miles; for large bodies 12 miles is all that can be counted upon. Small commands of seasoned infantry marching on good roads in cool weather can average more than 20 miles a day. (101)

Q. Under the varying conditions of the service, what are the rates of march for cavalry?

A. 1. The walk, 4 miles, the trot, 8 miles, and the gallop 12 miles per hour. The average walk of a horse is at the rate of a mile in 16 minutes or 3¾ miles per hour; the average trot a mile is 8 minutes or 7½ miles an hour.
2. In the field, the usual gait is the walk, which, including halts, makes about 3¼ to 3½ miles an hour.
3. The average march of cavalry, after men and animals are hardened, is 25 miles a day. (101)

Q. Under the varying conditions of the service, what are the rates of march of artillery?

A. The daily march of the field artillery is the same as that of the command of which it forms a part; if alone, it covers from 15 to 25 miles. The rate of horse artillery is the same as that of the cavalry to which it is attached. (101)

Q. What is the rate of march of wagon trains?

A. The rate of march of wagon trains varies with the condition of the draft animals, the load, the length of the column, and the condition of the roads. While large mules drawing light loads on

good roads can cover nearly 4 miles an hour, in long columns a rate of 2 miles an hour is all that can be expected. The daily march of a wagon train is about that of infantry. (101)

Q. What is the average load for a pack mule?

A. About 250 pounds.

Q. What rules govern the halts of a column of troops on the march?

A. The first halt is made after the troops have marched about 45 minutes, and is about 15 minutes long; after this, the troops are halted 10 minutes in each hour, that is, they march 50 minutes and halt 10 minutes. In very hot weather the halts may be more frequent and for longer periods.

For cavalry the hourly halts are shorter—5 minutes.

For artillery the hourly halts are from 5 to 10 minutes.

When the day's march will run well into the afternoon, a halt of about an hour at noon time is advantageous. (102)

Q. What rules govern the selection of places for halts?

A. 1. They should not be made in villages or towns where the object of the halt would be defeated.

2. Places for long halts should be selected with care; wood, water, grass, dry ground and shade are desirable features. (102)

Q. How may troops be marched so as to avoid the mid-day heat in hot weather or in the tropics?

A. If the march is long, the command may make an earlier start, or it may rest for three or four hours during the hottest part of the day and finish the march in the evening. As a general rule, it is undesirable to arrive at a strange place after nightfall, or even late in the afternoon. (102)

Q. What general rules govern the passage of troops through defiles, across bridges, etc.?

A. 1. The troops in rear are notified of the minimum length of the delay and conduct themselves as during a halt.

2. Where a reduction of front is necessary, every precaution is taken to prevent the interruption of troops in the rear. If the distances are not sufficient to prevent check, units are allowed to overlap.

3. If practicable, streams are crossed at two or more places.

4. In passing through short defiles the pace may be accelerated.

5. If a company unit is delayed while crossing an obstacle, the head slackens the pace or halts until all of that unit has passed; it then resumes its place in the column, increasing the pace if necessary. (103)

Q. What precautions are taken prior to the passage of troops over dangerous places?

A. A careful examination is made of fords, boggy places, bridges of a doubtful character, ice, etc., before attempting to cross.

When roads lead through swamps or quicksand, or across streams with treacherous bottoms, their limits are marked with stakes or bushes, or warnings are placed at dangerous points. At night lanterns are hung from the stakes, and a fire is built or a lantern hung from a stake to mark the landing. (103)

Q. What precautions are taken when troops cross fords?

A. 1. When the current is strong and the water deep, foot troops cross on as broad a front as possible, the men marching abreast and holding hands. They should not look at the water, but at the opposite shore.

2. If the ford is wide enough, mounted troops may cross at the same time upstream, thus breaking the force of the current. (103)

Q. When a passage of a stream is made in boats, what rules govern?

A. 1. Persons operating the ferry are interfered with as little as possible.

2. The men enter the boats singly at the bow and move gradually towards the stern.

3. The men retain the places assigned to them, so as not to interfere with the handling of the boat.

4. In small boats, and where the water is rough, they are required to sit down, and in case the passage is dangerous they may be required to remove equipments. (103)

Q. What rules govern the ferrying of animals across a stream?

A. 1. Horses are loaded one at a time. When there is room for a single row only, they are alternate, heads and tails; if in two rows, they face inward.

2. If a horse falls into the water he is turned loose. (103)

Q. What rules govern the supply of drinking water for the men on the march?

A. 1. Sources of water supply are examined by experts and marked good or bad. In countries infected with cholera or other injurious bacteria this action is imperative.

2. Soldiers should be trained to an economical use of water, and should keep a small supply in their canteens until there is opportunity to replenish it.

3. If water is plentiful, the men may drink often, but only a small quantity at a time.

4. Commanders will furnish the men ample opportunity for replenishing their canteens. This is done by order and not by straggling from the command.

5. In certain cases the advance guard may require the inhabitants to place water in vessels along the line of march for the convenient use of the troops.

6. On long marches, through country deficient in water, or where the water is bad, it may be necessary to carry a supply in wagons. (104)

Q. What rules govern the supply of drinking water for the animals on the march?

A. The watering of cavalry horses on the march depends largely upon the facilities available. In hot weather, or if nothing is known of the water supply for the day's march, the horses are watered before leaving the camp. Good opportunities on the road for watering should not be neglected. To avoid delay, as many troops as possible are watered at the same time. As the head of the column approaches a place suitable for watering, the several units are conducted to the different watering places. (104)

Q. What precautions are taken for the protection of troops against hot weather on the march?

A. 1. When practicable, halting places are selected where there are shade and free circulation of air, and the men are cautioned against drinking too much water.

2. Green leaves, or a moist handkerchief, in the hat, afford relief from the hot rays of the sun.

3. If the men are overheated, care is taken to prevent them from being chilled by exposure to cool winds or drafts. (104)

Q. How are marches classified?

A. 1. Marches in peace:
   (1) Marches in changing station.
   (2) Practice marches.

2. Marches in campaign:
   (1) Concentration marches.
   (2) Marches in the presence of the enemy.
   (3) Forced marches.
   (4) Night marches. (107).

Q. When change of station is made by marching, what elements does the daily march order contain?

A. 1. Distribution of troops.
2. Time of starting.
3. Location of camping places.
4. Service calls. (108)

Q. What rules govern the conduct of the march in changing station?

A. 1. The distances between the elements of the column may be materially increased.

2. In wet weather the mounted troops may be required to follow the foot troops. In going through high vegetation or snow the mounted troops may be required to precede the foot troops to break the way.

3. Field trains may be permitted to follow immediately in rear of their regiments and supply trains may be placed so as to facilitate issues. (108)

Q. What are the purposes of practice marches?

A. 1. That of hardening the men and animals and keeping them in proper physical condition.

2. That of instructing officers and men in duties incident to a campaign—marching, camping, cooking, etc.—and the principles of tactics, including the service of information and security. (109)

Q. For what purposes are concentration marches made?

A. To assemble at a certain time and place bodies of troops from different localities. (110)

Q. What action is taken when columns of troops meet on the march?

A. 1. A column of troops on the march should not be cut by another.

2. If the heads of two columns meet at a distance from the enemy, the senior commander has the right of way; if near the enemy the senior determines the action to be taken.

3. If a column in march overtakes another at a halt, it may pass on, provided the commander be senior or the other commander gives his consent. (110)

Q. What considerations control the march of troops in the presence of the enemy?

A. Tactical considerations. (111)

Q. What rules govern the conduct of the march of troops in the presence of the enemy?

A. 1. The order of march of the main body is determined by the contemplated employment of the troops.

2. When contact with the enemy is probable, columns are closed up on the march on broad fronts.

3. Communication is maintained between the columns on parallel roads.

4. All impedimenta not necessary in the conflict are kept in the rear.

5. If a part of a unit is assigned to the advance guard the remaining part of that unit marches at the head of the main body. (111)

Q. What rules govern the location of the artillery in the column when a march is conducted near the enemy?

A. 1. During the advance, in order to expedite the entry of the artillery into action, it is generally near the head of the main body, sufficient infantry leading to insure proper protection.

2. If there is danger to the flanks from small bodies of the enemy, the artillery may be broken into columns not longer than a regiment; it then marches like a convoy with infantry in front, in or near the center, and at the rear. (111)

Q. Outline the disposition of the troops of a division column marching on one road?

A. Advance Guard:

Troops:

One brigade of infantry.
One regiment cavalry.
One battalion field artillery.
One company engineers.
Detachment signal troops.
Detachment sanitary troops.

Dispositions:

Independent cavalry: one regiment, less one squadron, proceeds several miles to the front.

Advance cavalry: one squadron. Point and flanking patrols. Communication maintained with independent cavalry.

Support: one regiment infantry and mounted detachment of engineers. The support sends forward an advance party of one company about 500 yards, and this, in turn, is preceded by a point.

The Reserve, in order of march: one battalion infantry, one battalion artillery, two battalions infantry, one regiment infantry, one company engineers (less mounted detachment), one ambulance company.

Main Body, in order of march:

1 regiment infantry.
1 battalion field artillery.
1 regiment field artillery.
2 brigades infantry (less 1 regiment).
Engineers.
Signal troops.
Artillery combat trains.
Trains. (111)

Q. Who furnishes protection to the field trains?

A. The men on duty with the train, convalescents and other non-effectives, dismounted men of the cavalry, and men from the battery reserves in the artillery. (112)

Q. What action is taken when a wagon of the train breaks down?

A. Its load is transferred to other wagons and the road cleared as soon as practicable. (112)

Q. What factors control the conduct of forced marches?

A. The distance to be covered and the time in which the march must be accomplished. (113)

Q. What rules govern the forced marching of foot troops?

A. The number of marching hours are increased, the halts and periods for cooking being arranged so as to derive the greatest benefit.

The rules for the ordinary march are followed as closely as possible.

For large columns of infantry marching long distances, an increase of pace is seldom advisable.

The maximum day's march is 28 to 30 miles. The march cannot as a rule be prolonged profitably more than 36 hours.

Foot troops are favored in every way possible. They are assigned to the best roads and are not intermingled with vehicles or mounted men. If transportation is available, their packs are lightened. (113)

Q. What rules govern the forced marching of mounted troops?

A. The gait as well as the number of marching hours may be increased.

A rate of 50 miles in 24 hours may be maintained for several days.

In addition to the usual halts, a special halt of 2 hours is made at the end of the first half of each day's march, during which time the horses are unsaddled, permitted to roll and feed and lie down.

The rate is about 5 miles an hour, exclusive of halts.

Under favorable conditions, a march of 100 miles can be made in 24 to 30 hours.

If the march is more than 150 miles, the marches begin at not more than 50 miles a day. Where the distance is more than 200 miles, the length of march is reduced to 30 to 40 miles a day. (113)

Q. With what objects in view may night marches be made?

A. 1. In very hot weather, to avoid the heat of the day.

2. As a forced march, to surprise the enemy or to secure a favorable position from which he may be attacked during the night or at dawn. (114)

Q. What conditions favor night marching?

A. Moonlight and good roads. A waning moon is of advantage in marches beginning early in the morning. (114)

Q. What precautions are taken to keep the right road in night marches?

A. 1. Contact between units is maintained at all times.

2. Men are stationed to mark changes of direction.

3. Guides are employed.

4. When, due to unfavorable conditions, units cannot be kept well closed up, men will be placed at forks, road crossings, and at any other point where there is any danger of the units in rear taking the wrong road. (114)

Q. When night marches are made with secrecy, what precautions are taken?

A. Silence is maintained; mouthpieces of bugles are removed; articles of equipment are secured to prevent rattling; smoking is prohibited; villages and farmhouses are avoided on account of the warning that may be given by barking dogs. (114)

Q. In night marches where do the mounted troops march?

A. They ordinarily march in rear of the infantry. (114)

Q. What is the meaning of the term "convoy"?

A. On land, the term "convoy" is usually applied to the trains by which supplies are forwarded from depots or magazines in rear to an army; and to trains bringing in supplies collected by requisition. (115)

Q. What is the limit as to size for wagon convoys?

A. It should not, as a rule, contain more than 100 wagons. (116)

Q. Into what elements is a wagon convoy divided?

A. Into sections of 20 to 30 wagons each. A noncommissioned officer or wagon master is placed in charge of each section. (116)

Q. What is the distance between elements in a convoy?

A. About 25 yards between sections and about 2 yards between wagons. (117)

Q. How is security for a convoy provided?

A. By the escort: usually composed of infantry, with enough cavalry for scouting and communication, and some engineer troops. (118)

Q. Upon what factors does the convoy escort depend?

A. Upon the importance and size of the train, the risk, nature of the country, length of the journey, etc. A train containing explosives requires a strong escort to prevent the enemy from firing into it. (118)

Q. What is the distribution of troops in the convoy?

A. 1. Military police assigned to the different sections of the convoy.
2. The advance guard.
3. The main body.
4. Such flank guards as may be necessary.
5. The rear guard. (119)

Q. What are the functions of the advance guard of the escort?

A. The advance cavalry precedes the train 3 to 5 miles, scouting to the front and flanks. Careful examination is made of bridges, defiles and the country in the vicinity. Temporary guards are left at such points until the advance guard comes up. The remainder of the advance guard marches in normal advance-guard formation about a mile in front of the train. (119)

Q. Where does the main body of the escort march?

A. At the most important point, usually opposite the center of the train. (119)

Q. What are the general rules regarding the camping of the convoy and escort?

A. The place for camping is usually selected by the advance guard commander, due regard being paid to water supply, fuel, grass, and facilities for defense. A field inclosed by a wire fence is advantageous.

The train is parked, the formation depending upon the proximity and character of the enemy and the amount of ground available. When the enemy is at a distance the train is usually parked in column of sections or half-sections with distances of about 20 yards between subdivisions, and intervals of 6 to 8 yards between wagons. A compact formation is secured by placing the wagons axle to axle and tying the animals to picket lines in front of the wagons. For purposes of defense, wagons may be placed in two lines facing each other in the form of a square, rectangle, oval, or circle, the poles inside. The enclosure thus formed furnishes shelter for the men and animals inside. When there is time, wire entanglements are constructed and shelter trenches dug outside the corral. (120)

Q. Describe the forming of the diamond corral and state its advantages?

A. It is formed as the wagons successively arrive on the ground. If the nature of the ground permits, the teams of the first two sections may countermarch before forming the corral, thus obviating the necessity of unhitching. The advantages are that it can be rapidly formed and the march quickly resumed. (120)

Q. What are the most vulnerable parts of a convoy?

A. The flanks. (121)

Q. What tactics are employed by the escort?

A. 1. The chief duty of the escort is to keep the enemy from gaining a position permitting effective fire on the train.
2. The escort fights only when necessary, and does not pursue when the enemy is repulsed.
3. If the enemy is reported near, the wagons are closed up and the march is continued in the most orderly manner possible. If practicable, the wagons are formed in double column.
4. If the enemy holds a commanding position or a defile on the line of march, he is either dislodged by the escort or the convoy takes another road.
5. The advance cavalry reports the presence of the enemy with the utmost dispatch so that the commander may change the direction of the march, park the train, or make a retreat.
6. If menaced by small parties of the enemy, the convoy continues its march under the protection of the escort. If attacked by a superior force, the train is parked or a corral formed. Skirmishers are thrown out to delay the enemy and gain time for the formation. If possible, a defensive position at some distance from the train is intrenched and prepared for stubborn resistance. Word is sent to the nearest troops. Should the enemy be repulsed, his retreat is carefully verified before the march is resumed. If it is evident that the train cannot be saved, the commander escapes with the most valuable part, the remainder being destroyed. (121)

Q. What is the most favorable time for attacking a convoy?

A. When it is passing through woods, a defile, over a bridge; when it is going

around a sharp bend in a road; when it is ascending or descending difficult slopes or passing over bad sections of road; when it is beginning to form corral; when teams are being watered; or, generally, whenever the conditions are such that the escort cannot quickly prepare for defense. (122)

Q. What tactics are employed in attacking a convoy?

A. The attacking force endeavors to bring the convoy to a halt and to throw it into confusion by making an attack from an unexpected quarter. The fire of artillery and machine guns is very effective. (122)

Q. What methods are employed in the conduct of a convoy of prisoners?

A. In addition to a guard to prevent attempts at rescue, a guard of about 100 foot-soldiers and several mounted men is required for every 100 prisoners. The prisoners are formed in companies and marched in column, their officers marching separately. Prisoners are treated kindly, but they must be given to understand that any attempt to escape will draw fire. If the convoy is attacked, they are ordered to lie down. At night they are placed in well-lighted buildings or enclosures. (123)

Q. What methods are employed for the convoy of boats on interior waterways?

A. For protection against guerillas and raiding parties, a shallow draft steamboat, provided with machine guns and shelter against rifle fire, carries part of the escort and precedes the convoy. Means for rapidly disembarking the escort is provided in order that hostile parties on shore may be dislodged. In case of narrow streams, or canals, lined with woods or other cover, it may be necessary to have the escort march on both banks and clear the country as it advances. (124)

SHELTER

Q. Under the varying conditions of the service, how are troops sheltered?

A. In time of peace troops in the field are generally sheltered under canvas. In local insurrections, riot or disorder, public buildings in the disturbed district may be used when other shelter is not provided. Private buildings are not entered without the owner's consent, except in the performance of duty. (232)

Q. Under what conditions is seizure of buildings made for shelter?

A. In enemy territory, public and private buildings may be used to shelter troops and for other military purposes. When these buildings are to be taken for shelter, the civil authorities should be consulted and satisfactory arrangements made. Families are not to be removed from their dwellings if it can be avoided. (232)

Q. Distinguish between the terms "camp," "bivouac," and "cantonment"?

A. When troops are sheltered under canvas, they are in camp.

When they rest on the ground without shelter, they are in bivouac.

When they occupy buildings in towns and villages or occupy huts specially erected, they are in cantonment. (233)

Q. To what conditions are cantonments especially adapted?

A. 1. During prolonged suspension of hostilities.

2. When enemy territory is occupied.

3. During sieges. (233)

Q. What is meant by "billeting"?

A. The assignment of troops to public and private buildings for quarters. (234)

Q. What conditions should mobilization and concentration camps fulfill?

A. 1. The grounds should be easily drained, naturally healthful and large enough for depots, corrals, hospitals, etc., and the encampment of the troops without crowding and with ample space for exercise and instruction.

2. The water supply should be excellent and abundant and not liable to contamination from any source.

3. There should be ample railroad and switching facilities, and suitable arrangements for loading and unloading.

4. All parts of the camp should be easily accessible by good roads. (236)

Q. What arrangements are made for the shelter of troops before they arrive at a mobilization or concentration camp?

A. 1. Camps are laid out so as to preserve the integrity of units.

2. Tents are pitched and aligned.

3. Kitchens are equipped and arrangements made for the water and fuel supply.
4. Latrines are prepared.
5. Hospitals are erected.
6. Arrangements for mail, telegraph, and telephone service.
7. Depots and storehouses are constructed. (236)

Q. What rules govern the shelter and supply of troops in active campaign?

A. If troops are actually engaged in field operations, their equipment, including tentage, is limited to that carried on the men and animals and in the trains. In certain instances, local buildings may be used.

If the length of a halt is to be considerable, when practicable additional camp equipment, baggage, tents, surplus kits, etc., are sent forward and placed at the disposition of organizations to the end that the troops may be made as comfortable as possible during the halt. (237)

Q. What requisites should camp sites in war fulfill when tactical considerations are not paramount?

A. 1. The ground should accommodate the command with as little crowding as possible, be easily drained, and have no stagnant water within 300 yards.
2. The water supply should be ample, pure and accessible.
3. There should be good roads to camp and good interior communication.
4. Wood, grass, forage and supplies must be at hand or easily obtainable. (238)

Q. What classes of ground make the best camp sites?

A. Closely cropped turf with sandy or gravelly subsoil; high banks of rivers, provided no marshes are near, are suitable. In hot weather months, the ground selected should be high, free from underbrush, and shaded with trees if possible. In cold weather ground sloping to the south with woods to break the north winds is desirable. (238)

Q. What classes of ground should be avoided in the selection of camp sites?

A. Old camp grounds and ground in the vicinity of cemeteries are undesirable. Marshy ground and ground near stagnant water are to be avoided. Thick forests, dense vegetation, made ground, alluvial soil, punch-bowl depressions, inclosed ravines, and dry beds of streams are unfavorable camp sites. (238)

Q. What rules govern the form and dimension of camps?

A. The form of a camp should be such as to facilitate the prompt encampment of troops after a march and their prompt departure when camp is broken. It will depend upon the tactical situation and the amount of ground available. In one-night halts in the presence of the enemy, camps must of necessity be contracted. Where a more protracted halt is contemplated and where the tactical situation permits, a more comfortable arrangement may be made by the expansion of the camp. (239)

Q. What is the procedure in establishing a camp in campaign?

A. A staff officer, accompanied by representatives from each command, precedes the troops. Camping places are assigned and the troops conducted thereto, as they arrive. The place for procuring drinking and cooking water, for watering animals and bathing and for washing clothing, in the order named from upstream down, are designated and marked. On the arrival of troops, guards are posted over the water supply. The interior camp guards are posted. The remaining troops pitch their tents, make camp, establish kitchens and picket lines. In the presence of the enemy, assembly places in case of attack are designated. (240)

Q. What is the procedure when troops are billeted?

A. Staff officers and representatives from each unit precede the column. The staff officer confers with the civil authorities and makes an equitable distribution of the quarters available and assigns sections to each unit. The troops are assigned to buildings by the immediate representatives. (241)

Q. Under what conditions are bivouacs established?

A. 1. In the presence of the enemy, such action may be necessary.
2. In fine weather, in midsummer, or in the tropics, the troops may bivouac from choice. (242)

Q. What precautions are taken in the selection of a bivouac site?

A. The general principles that govern in the selection of a camp site are the same. The ground should be dry and protected from sun and wind. Light woods are nearly always good sites for infantry bivouacs on account of the available shelter and material. (242)

Q. What arrangements and rules govern the sheltering of troops during battle?

A. During a lull in an engagement, or when hostilities are suspended for the night, the troops bivouac in line of battle on or near the position they occupy, the officers in rear of the center of their units. Reserves, required to be in instant readiness, generally bivouac in column with a flank to the front. (243)

Q. How is shelter during sieges provided?

A. The main body is some five miles to the rear, in camp or cantonment. To guard against surprise, a large part of the command is continually on outpost, and when they complete their tours of duty the troops return to their own camps. (244)

Q. What precautions are taken with respect to the sleeping arrangements of the men in camp and bivouac?

A. The men should not lie on the ground. In temporary camps and in bivouac they raise their beds if suitable material such as straw, leaves or boughs is available, or use their ponchos or slickers. In cold weather, when fuel is plentiful, the ground may be warmed by fires, the men making their beds after raking away the ashes. (245)

Q. What action is taken when a camp is to be occupied for some length of time?

A. All underbrush is cleared away and the camp made as comfortable as possible. Watering troughs, shelter in cold weather, and shade in hot weather are provided for the animals, if practicable. (245)

Q. What is the daily routine prescribed for troops in camps?

A. Guard and other routine duties follow about the same course as when in garrison. The watering, feeding and grooming of animals take place at regular hours under the supervision of officers.

The camp is policed daily after breakfast and all refuse matter is burned. Weather permitting, the walls of tents are raised and the bedding and clothing aired daily. (245)

Q. What precautions are taken with respect to the water supply of the camp?

A. 1. The water supply is carefully guarded. When several units are camped along the same stream, this matter is regulated by the senior commander.

2. If the stream is small, the supply may be increased by building dams. Small springs will be dug out and lined with stone or brick, or empty barrels may be sunk in them. Surface drainage may be kept off by a bank of clay around the spring.

3. When sterilized water is not provided, or when there is doubt as to the purity of the water, it is boiled twenty minutes, then cooled and aerated. (245)

Q. Where are latrines located?

A. Always on the opposite side of the camp from the kitchens.

Q. What are the general rules with respect to the class of latrines to be provided in the various types of camps?

A. 1. When the camp is for one night only, straddle trenches will suffice.

2. In camps of longer duration, and when it is possible to provide latrine boxes, as in permanent camps, deeper trenches should be dug. These may be used as straddle trenches or a box provided or a seat improvised.

3. In more permanent camps, the trenches are not over 2 feet wide, 6 feet deep and 12 feet long, and suitably screened. Seats with lids are provided, and the boxes extend down to the ground and made flyproof. Urinal troughs, which discharge into the trenches, are provided. Latrine boxes are thoroughly cleaned daily. The seats are scrubbed. The pit is burned out with oil and straw or hay. When these latrines are filled within 2 feet of the surface, they are filled in and discarded and their positions carefully marked. (245)

Q. What precautions are taken when open trenches are used?

A. The excrement must be kept covered at all times with a layer of earth. They are always filled before the march is resumed the next morning. (245)

Book Reviews

Mobilizing America. By Arthur Bullard, author of "The Diplomacy of the Great War," etc. New York: The Macmillan Company, 1917. Boards, 16mo, 129 pages. Price, 50 cents.

This is a most readable little book, and is a summary of the main points the author had intended to develop at length in a book on "How Democracies Mobilize."

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Our Flag and Its Message. By Majors Moss and Stewart. Price, 25 cents.

This is a small booklet of 31 pages, containing the President's "Appeal for Unity" and a brief but beautiful and patriotic description of the significant features of the Flag, the Stripes, the Stars, the Colors, and the Message the Flag bears.

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